

ROADS AND STREETS

TECHNOLOGY DEPT.

JULY, 1943

PUBLIC LIBRARY

JUL 27 1943

DETROIT



In This Issue: Big Cement-Treated Base Job . . . Hot Mix Resurface . . .
Illinois Pavement Patching Program . . . Calcium Chloride Patching-Mix Tests . . . Madison's
Long Range Plan . . . Dark Concrete "Specs" . . . Keeping Up Cincinnati's Fleet . . . Scraper
Overhaul . . . Acetylene Welding "Don'ts" . . . Care of Rock Drills . . . Power Shovel Upkeep

DURABILITY



TO KEEP YOUR GRADERS ROLLING FOR VICTORY...

- ✓ Check condition of engine regularly.
- ✓ Change lubricating oil and renew filter elements every 100 hours of use.
- ✓ Lubricate all parts of grader regularly.
- ✓ Service air cleaner every 10 hours of use.
- ✓ Clean fuel oil filters at least every 60 hours.
- ✓ Don't ride clutch. Adjust clutch pedal when and as needed.
- ✓ Keep electrical system in good condition—check battery regularly.
- ✓ Keep lost motion out of grader—use adjustments for wear and replace parts worn out.
- ✓ Keep tires inflated to recommended pressure.

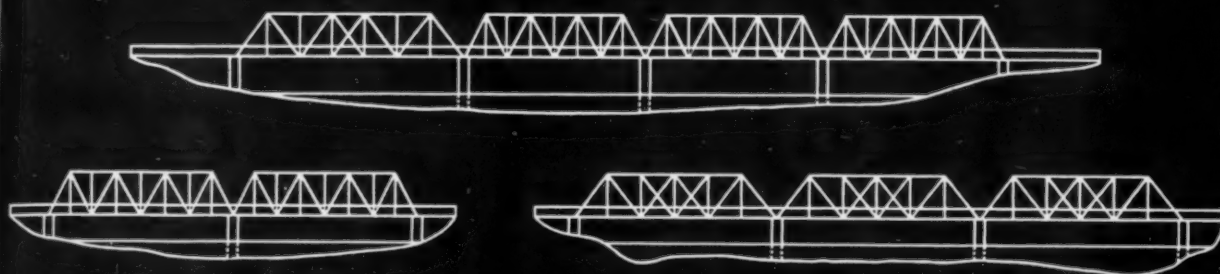
If you need help or advice on any of the above, see your local Adams distributor.

★ **J**UST AS MODERN TANKS are built to take the terrific battering of front line warfare, so Adams Motor Graders are built to withstand the severe shocks and stresses of carving roads, airfields and naval bases out of all kinds of terrain in all parts of the world . . . Whether in the frozen tundra of Alaska, the rocky hills of Tunisia or the dense jungles of New Guinea, Adams machines keep hard at work with minimum attention . . . DURABILITY is but one of the many Adams features you'll want to consider when choosing equipment for your post-war jobs!

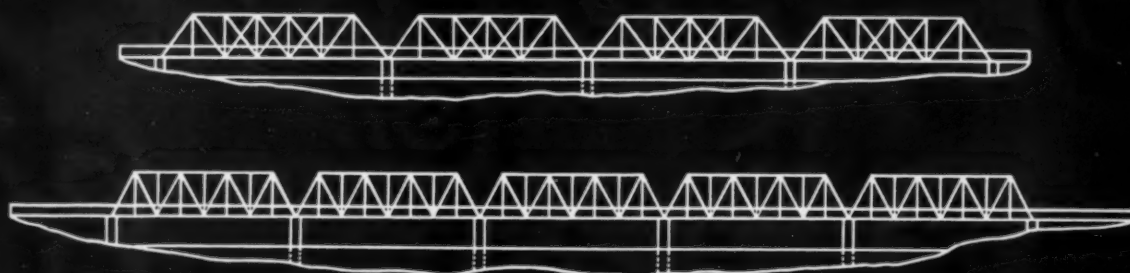
J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA

Adams motor graders, leveling wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.

Adams
ROAD-BUILDING AND
EARTH-MOVING EQUIPMENT



Building 3 New Bridges from 2 Old Ones



The Army needed quickly three steel railroad bridges to connect two parts of a Tennessee ordnance plant split by three channels of a wide, shallow river. Because new steel was not immediately available, the Army decided to build the bridges from parts of two very old, abandoned bridges.

Bethlehem's job consisted of taking down nine truss spans from the two old crossings, making alterations and rearrangements, and re-erecting the 1243 tons of old steel-work into the new bridges.

Many difficulties were met. The two crossings had a 45 deg. skew at each end which had to be eliminated. All of the truss spans were pin-connected. The removal of these pins, which were "frozen"

fast with rust, was a problem. Falsework had to be built to support every panel point, as the members were removed and re-erected. Each member had to be marked so that it would be re-erected in precisely the same position in the new structure. Dismantling was complicated by transportation difficulties and proceeded slowly, because only one span could be taken apart at a time, using only two derricks. And 31,000 rivets had to be cut out and later redriven.

Despite these difficulties, Bethlehem crews, working nine hours a day, six days a week, completed the entire removal operation in three months. This is an average of only ten calendar days per span, including holidays. About the same

number of man-hours was needed to erect the new bridge.

Made necessary by wartime conditions, the successful completion of this job is an example of the flexibility and versatility of Bethlehem's Fabricated Steel Construction Division. The organization that built these three new structures from two old bridges is the same organization that has constructed in record time hundreds of acres of tank factories, airplane plants, shipbuilding ways, and many other units of the arsenal of democracy.



ROADS AND STREETS

Vol. 86, No. 7

July, 1943



A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD
ROADS MAGAZINE AND ENGINEERING & CONTRACTING

CONTENTS

Cement-Treated Base Plus Plant Mix.....	35
By A. N. Lund, Asst. Dist. Construction Engineer, Calif. Division of Highways, San Luis Obispo	
Hot-Mix Resurface Contract.....	39
By W. H. Moore, Division Engineer, Ohio, Dept. of Highways, Ravenna	
Illinois Concrete Patching Program.....	41
Effect of Calcium Chloride Admixture on Strength of Concrete Cured at Low Temperatures.....	45
By H. W. Russell, Engineer of Materials, Illinois Division of Highways, Springfield	
Madison Has Long-Range Plan.....	49
By T. F. Harrington, City Engineer and Secretary, Post War Planning Committee, Madison, Wis.	
World's Greatest Timber Structure.....	52
By Holman Harvey	
How District of Columbia Uses Dark Concrete.....	53
By H. C. Whitehurst, Director of Highways, District of Columbia, Washington, D. C.	
Editorial.....	56
Explosives.....	58
Construction Equipment Maintenance.....	65
Keeping Up Cincinnati's Fleet.....	67
By Harold J. McKeever, Associate Editor, ROADS AND STREETS	
Scraper Meets Stump.....	71
Care of Rock Drills.....	72
By Ed C. Powers [For the Educational Committee, Compressed Air Institute]	
Maintenance Tips for Shovel Operators.....	76
Don'ts for Acetylene Operators.....	78
Maintenance Hints on Your Motors and Generators..	79
New Equipment and Materials.....	81
New Trade Literature.....	84
Coronach.....	85
With the Manufacturers.....	86

Published by Gillette Publishing Co. Acceptance under the Act of June 5, 1934, authorized January 25, 1938, at Chicago, Illinois. Subscription price \$3.00 per year in the United States, \$3.40 per year in Canada, \$4.00 per year for foreign mailing.

ROADS AND STREETS, July, 1943

STAFF

HALBERT P. GILLETTE, Editor-in-Chief

EDWARD S. GILLETTE,
Editor and Publisher

CHARLES T. MURRAY
Managing Editor

JOHN C. BLACK, Field Editor

HAROLD J. McKEEVER
Associate Editor

LT. COL. V. J. BROWN
Publishing Director
(Absent on Military Duty)

H. J. CONWAY
Advertising Editor

L. R. VICKERS
Promotional Director

GILLETTE PUBLISHING COMPANY

330 S. Wells St., Chicago (6), Ill.
ESTABLISHED 1906

PUBLISHERS OF
ROADS AND STREETS
POWERS' ROAD AND
STREET CATALOG

WATER WORKS AND
SEWERAGE

CAMINOS Y CALLES

TECHNICAL BOOKS

BUSINESS REPRESENTATIVES

Chicago Office

L. H. LINGNOR, Manager

E. C. KELLY

E. H. HICKEY

330 S. Wells St., Chicago (6), Ill.

Telephone: Harrison 1843

New York Office

J. M. ANGELL, JR.

155 East 44th St., New York 17, N. Y.

Telephone: Murrayhill 2-4023

Cleveland Office

LEE B. McMAHON

859 Leader Bldg.

Los Angeles Office

DON HARWAY & CO.

816 West Fifth St., Los Angeles, Calif.

Telephone: Mutual 8612

This drawing is a designer's conception of what a post-war shovel might look like.



THE ADVANCE GUARD for POST-WAR PLANNING

Here is a group of men you should know about. They are the Lorain distributors spanning the breadth and length of the country to serve the construction industry.

They are a *very real* advance guard for post-war planning because without their functions and services, any post-war construction boom may be delayed or handicapped. Right now, they can perform these two very important functions to help you get ready:

1 They can offer a valuable war-time service of equipment conservation and repair of badly needed machines.

2 They are the source for all information on any new types or designs of post-war equipment, and can advise you on the latest, most efficient methods of material handling.

These men *will be* in business after the war. They stand ready to work with you for a quicker victory and a progressive, profitable post-war period. Why not get acquainted now?

THE THEW SHOVEL CO.
Lorain, Ohio

Get Acquainted with Your Lorain Distributors

ALA. ...J. D. Pittman Tractor Co., Birmingham
Burford-Toothaker Tractor, Montgom'y
ARIZ. ...State Tractor & Equip. Co., Phoenix
ARK. ...Little Rock Road Mchy., Little Rock
CAL.Le Roi-Rix Mchy. Co., Los Angeles
Coast Equip. Co., San Francisco
COLO. ...Liberty Trucks & Parts Co., Denver
CONN. ...Truck Sales & Parts Co., Bridgeport
FLA.Clewiston Motor Co., Clewiston
Burgman Tractor Equip., Jacksonville
Shelley Tractor & Equip. Co., Miami
GA.Yancey Tractor Co., Albany
Yancey Bros. Co., Atlanta
IDAHO...Bunting Tractor, Boise and Twin Falls
ILL.R. C. Larkin Co., Chicago
Peoria Tractor & Equip. Co., Peoria
Central Illinois Tractor & Equip. Co.,
Springfield
IND.Indiana Equipment Co., Indianapolis
IOWA. ..Gierke-Robinson Co., Davenport
Carl R. Miller Tractor Co., Des Moines
KY.Roy C. Wayne Supply Co., Louisville
LA.Louisiana Tractor & Mchy., Baton
Rouge and Monroe
MD.Clark & Freeland, Inc., Baltimore
MASS. ..Tractors, Inc., Newton Highlands.

MICH. ..W. H. Anderson Co.,
Inc., Detroit; Brebner-Sinz
Mchy. Co., Marquette
MINN. ..Minneapolis Equip. Co., Minneapolis
MISS. ..Mississippi Tractor & Equip., Jackson
MO.Bublitz Mchy. Co., Kansas City
John Fabick Tractor Co., St. Louis
MONT. ..Connelly Mchy. Co., Billings and Great
Falls
NEBR. ..American Mchy. & Supply Co., Omaha
NEV. ...Sanford Tractor & Equip Co., Reno
N. J. ...Grey Steel Products Co., Glen Rock
N. Y.Good Roads Mchy. Co., Albany
T. E. Potts, Kenmore
N. C. ...Carolina Tractor & Equip Co., Raleigh
and Salisbury
OHIO...Highway Equip. Co., Cincinnati
The Taylor Tractor Co., Columbus
OKLA. ..Wylie-Stewart Mchy. Co., Okla. City
ORE. ...Bunting Tractor Co., Inc., La Grande
Columbia Equip. Co., Portland
PA.L. B. Smith, Inc., Camp Hill
Atlas Equip. Corp., Pittsburgh
H. C. Knight, Philadelphia
R. I.Tractors, Inc., Providence
S. C.Jeff Hunt Road Mchy. Co., Columbia
TENN. ..R. L. Harris, Inc., Knoxville
Taylor Mchy. Co., Memphis
McCarthy, Jones & Woodward, Nashville
TEX.Browning-Ferris, Dallas and Houston
UTAH...Cate Equip. Co., Inc., Salt Lake City
VA.Richmond Mchy. & Equip. Co., Richm'd
WASH. ...Columbia Equip. Co., Spokane
A. H. Cox & Co., Seattle
WIS.Brebner-Sinz Mchy. Co., Green Bay
Drott Tractor Co., Inc., Milwaukee
WYO. ..Wilson Equip. & Supply Co., Cheyenne

thew.

Lorain



It's Hard
to Get Steel
**BUT YOU
CAN GET
DRAINAGE**



• America at war can afford no interruption of vital traffic. Proper drainage is doubly important now. Yet desirable as it is, steel must not be used in any drainage structure unless engineering integrity demands it. Even so, perhaps we can help you in other ways.

For example, ARMCO Emergency Pipe may be just the answer to your wartime drainage problems. This completely new design in wood pipe requires no steel sheets, bands, wire mesh or metal reinforcing. It

is easy to handle and has ample strength to meet engineering standards. ARMCO Wood pipe is designed to last through the emergency. On more permanent installations, when replacement becomes necessary, a corrugated metal pipe may easily be threaded through or jacked around the wood structure.

Remember that ARMCO Corrugated Metal Pipe is only on temporary "leave of absence." It will be back with its flexible strength, ease of handling, tight joints, long

lengths and low installation costs. Asbestos-Bonded Coatings and thick bituminous pavements will be back too—better than ever before—to guard against corrosion and erosion.

Meanwhile, can we assist with your drainage problems? The answer may be in the use of non-strategic materials, or in suggestions for repairing and salvaging older structures. Write to us for information. Armco Drainage Products Association, 15 Curtis St., Middletown, O.

ARMCO



EMERGENCY PIPE

tough JOBS DEMAND tough TRUCKS



50 FWDs

in Non-Stop, Heavy Duty
Service, 24 Hours a Day

Conquer ALCAN HIGHWAY PROBLEMS!



Jobs don't come tougher for trucks than the building and operation of the 1600-mile ALCAN Highway. Through Canadian mountain wilderness, muskeg and swamp, FWD's have conquered every phase of this tough job for trucks.

FWD's were in on the construction work . . . hundreds now operate as military cargo trucks . . . others, with heavy snowplows, are relied upon for snow removal service . . . many, mounted with equipment for road building, maintenance, telephone, light and power line construction, are proving their versatility and all-'round ability to conquer these toughest of jobs, on non-stop, 24-hour-a-day schedules, every day!

Whatever the job may be...whether the "objectives" are military or commercial . . . rugged FWD's have the power and stamina to stand the most punishing service.

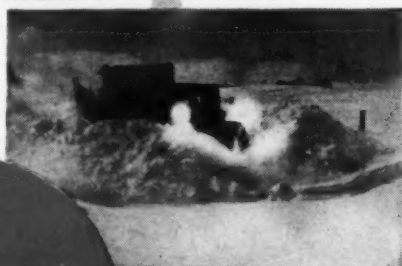
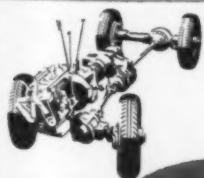
THE FOUR WHEEL DRIVE AUTO CO.

CLINTONVILLE, WISCONSIN

Canadian Factory: Kitchener, Ontario

(The Oldest and Original Exclusive Builders of Four-Wheel-Drive Trucks)

The True Four-Wheel-Drive Principle with Center Differential SAVES Tires—Gas—Oil—Replacements



FWD

TRUCKS



COMMERCIAL



CONSTRUCTION



UTILITIES



OIL FIELDS



MILITARY

GOING PLACES



This howitzer packs a knock-out wallop that will hasten the day of victory.

ON THIS PAGE . . . weapons of war; produced in ever larger quantities, and "going places" where they can be used most effectively.

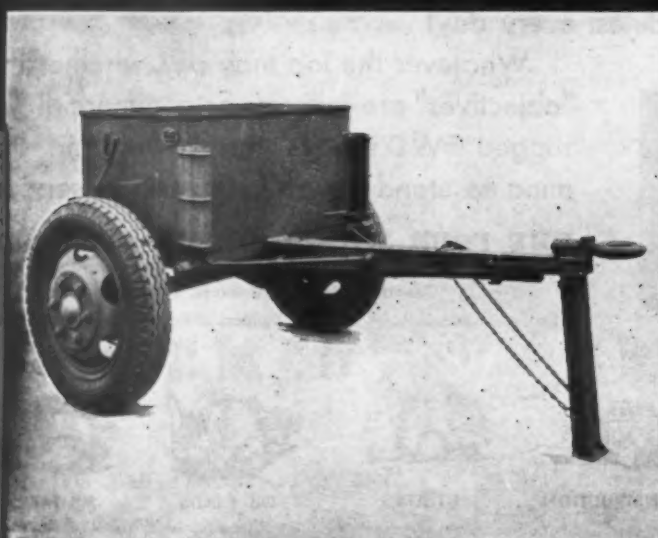
ON THE OPPOSITE PAGE . . . peace-time products; now "doing things" in a war

effort that stretches around the globe.

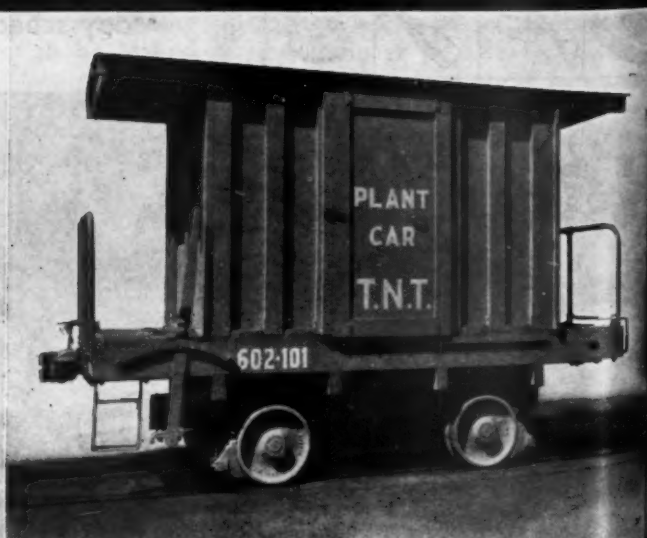
Behind both types of product are engineering research, topnotch manufacturing facilities and trained craftsmen, equally skilled in producing equipment of highest quality, for war or peace.

THE AUSTIN-WESTERN ROAD MACHINERY CO., AURORA, ILLINOIS, U. S. A.

Hundreds of these Aurora-built caissons are serving our artillery in far-flung corners of the world.



Designed especially for handling TNT, there is almost no metal in this car. Even the brake shoes are wood.

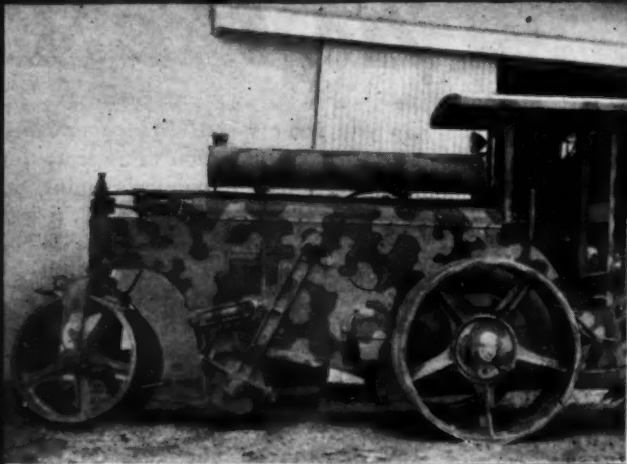


Doing Things!



← The 99-M Power Grader, with its exclusive All-Wheel Drive and Steer, is ideal for airport construction, or wherever power and traction are at a premium.

→ The good job of camouflage will help this Cadet Roller stay on its job at a Caribbean base.



← The famous "WESTERN" Dump Cars and Trail Cars are playing an important part in the rush hauling of ore, and other strategic raw materials.

→ This 99-M Power Grader, with Loader Attachment, is opening the route to strategic ore deposits in the heart of the South American jungle.



← Thousands of tons of gravel are being turned out at a Navy ammunition dump by this Twin-Unit Crushing Plant.

→ Hundreds of Patrol Sweepers are keeping runways and aprons clean and safe, at air bases and airplane factories.



BUILDERS OF ROAD MACHINERY

Austin Western

SINCE 1859



The Austin-Western line includes POWER GRADERS, ROAD GRADERS, ELEVATING GRADERS, ROAD ROLLERS, SHOVELS AND CRANES, STREET SWEEPERS, DUMP CARS, TRAIL CARS AND A COMPLETE LINE OF ROCK CRUSHING AND SCREENING PLANTS.

Any Way You Look At It It's the Buckeye '410'!

Do you want speed? Maneuverability? Ease of handling? Low fuel consumption? Power to hog out trench in the toughest going? Maximum digging range in one machine? You'll be able to get them all in this fast, compact Buckeye ladder type trencher when we've knocked the hero out of Hirohito and the hit out of Hitler. Navy "Seabees" and army engineers are now using them for the preliminaries before the big bout.

The "410" digs clean trench 18" to 24" wide and up to 6' deep. Operates in space less than 8' wide; cutting feeds from 46/100' to 38' per minute; cutting speeds of 31' to 189' per minute. The all-around trencher for service pipe, water and gas mains, sewerage, airport and highway drainage. Plan ahead—send for Bulletin 45.



Buckeye Traction Ditcher Co., Findlay, Ohio Check Pages 16-17

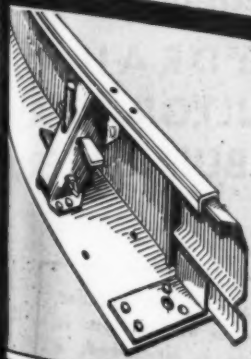
Buckeye✓

CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS. TRACTOR EQUIPMENT, R-B FINEGRADERS, ROAD WIDENERS AND SPREADERS

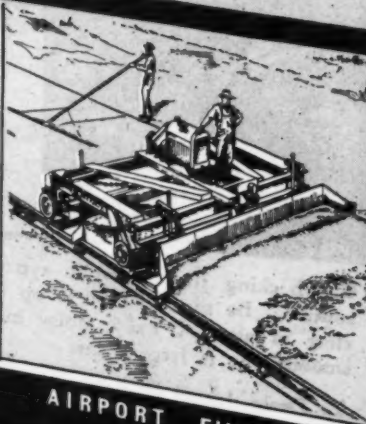


EARMARKED..

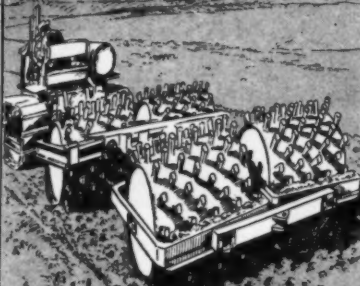
FOR OUR ARMED FORCES
ALL OVER THE WORLD



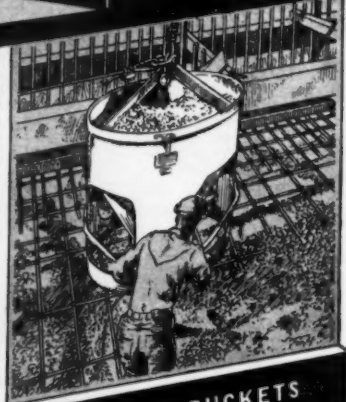
AIRPORT
PAVING FORMS



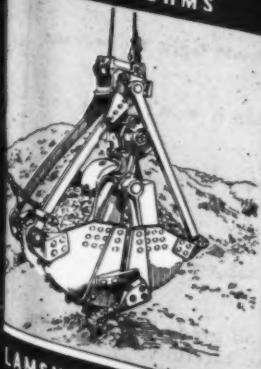
AIRPORT FINISHING
MACHINES



TAMPING ROLLERS



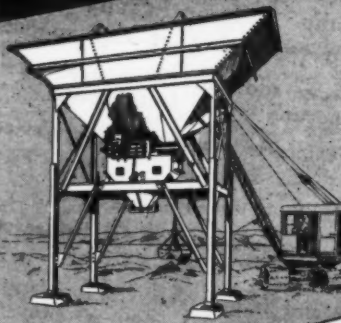
CONCRETE BUCKETS



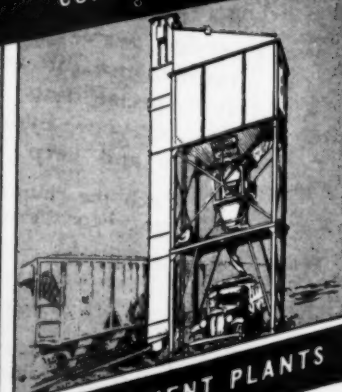
LAMSHELL BUCKETS



AIRPORT
PAVING SPREADERS



AGGREGATE
BATCHING PLANTS



BULK CEMENT PLANTS

We place great value on the good will and friendship of our customers and distributors. It is our desire to supply their equipment requirements as far as we possibly can — but in all our hearts minds and activities the winning of the war takes precedence — so the production of Blaw-Knox Construction Equipment is earmarked "first for our armed forces."

We have planned to have some units of the above equipment available for shipment to domestic users on essential military projects. An inquiry to your nearest Blaw-Knox Distributor will develop whether we can make shipment and when.

If we cannot supply your needs you will know the reason why — "first for our armed forces."

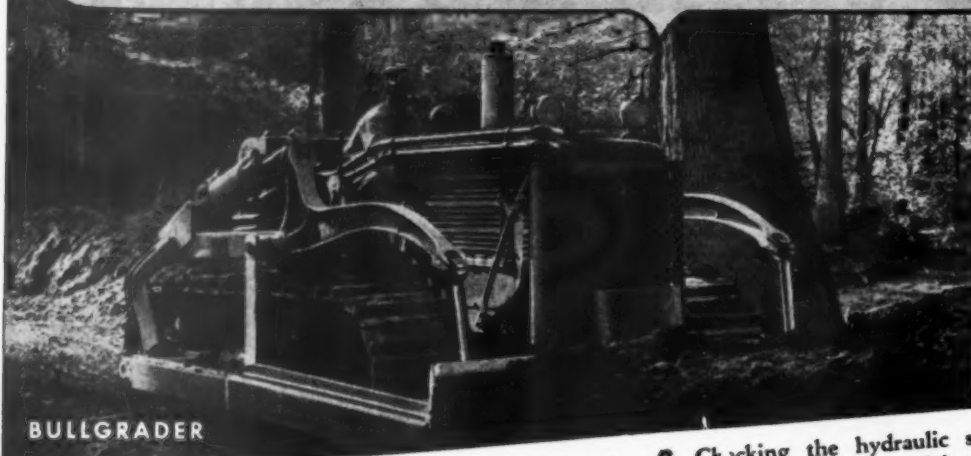


BLAW-KNOX

**BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY**
2003 Farmers Bank Bldg., Pittsburgh, Pa.
NEW YORK • CHICAGO • PHILADELPHIA
BIRMINGHAM • WASHINGTON
Representatives in Principal Cities

★ ★ ★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★ ★ ★ ★

Keep Your *Hydraulic* Blade Equipment **DIGGING TO WIN!**



BULLGRADER

Bucyrus-Erie
**HYDRAULIC
BULLGRADERS
& BULLDOZERS**

With new equipment reserved for our armed forces and existing equipment called on to take the punishment of wartime, highspeed 3-shift service, we've all got to pitch in and do a maintenance job as never before. Here are a few special hints that will prolong the useful life of your hydraulic Bullgraders and Bulldozers and keep 'em producing at top speed:

1. Watch the cutting edge and don't allow it to wear down to where the supporting casting is damaged.
2. Cutting edge can be reversed to give longer service when front edge is worn.
3. Keep the corner bits built up and hard-faced.
4. Don't allow pins to wear down too far before replacing or building up.
5. Inspect the blade and frame regularly for fatigue cracks, and weld them before they become serious.
6. Checking the hydraulic system should be regular routine. Be sure that oil is up to level and system is clear of air. A jerky, noisy machine is air-bound; a smooth one is free of air.
7. Drain the oil when it is dirty. Floating particles wear the pump and valve.
8. Keep all hose and pipe connections tight to prevent loss of oil and infiltration of air.
9. Inspect hydraulic hose to be sure it won't chafe and isn't twisted.
10. Keep bolts tight and all parts of the machine adjusted correctly.
11. Clean off dried mud or caked grease and maintain paint surfaces on all parts not subject to abrasion or moving contact.
12. Lubricate regularly. Use good grade lubricants and follow manufacturer's instructions carefully.

Your International TracTractor Distributor will gladly advise you regarding proper maintenance and lubrication.



BULLDOZER

**BUCYRUS
ERIE**
TRACTOR EQUIPMENT

SEE YOUR
INTERNATIONAL TRACTRACTOR
DISTRIBUTOR

Sluggers!

• No job is too tough for Clevelands! For these big, husky tools pack a mighty wallop—work at top speed—but take it easy on air consumption. Just what you need for every type of job—sinkers, wagon drills, paving breakers, clay and trench diggers, backfill tampers—and in the right sizes and styles. All the accessories, too—drill steel and rods, detachable bits, paving breaker chisels, air hose, valves and couplings. ★ Ask for the new Cleveland Catalog. Big and full of facts, it will help you in your work.

BRANCH OFFICES

Birmingham, Ala.
Berkeley, Calif.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Chicago, Ill.
Cincinnati, Ohio
Dallas, Texas

Detroit, Mich.
El Paso, Texas
Ironwood, Mich.
Knoxville, Tenn.
Lexington, Ky.
Los Angeles, Calif.
Milwaukee, Wis.
New York, N. Y.

Philadelphia, Pa.
Pittsburgh, Pa.
Richmond, Va.
Salt Lake City, Utah
St. Louis, Mo.
Victor, Colo.
Wallace, Idaho
Washington, D. C.

CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 688 Hornby Street, Vancouver, B. C.
Whitehall Machine & Tools, Ltd., Galt, Ontario

BUY U. S. WAR BONDS AND STAMPS

THE CLEVELAND ROCK DRILL COMPANY

Division of The Cleveland Pneumatic Tool Company

CABLE ADDRESS: "ROCKDRILL"

CLEVELAND 5, OHIO

LEADERS IN DRILLING EQUIPMENT

CP Sinkers Can take it—



JUST GIVE THEM ORDINARY CARE

FEW hand-held drills are as well designed, as ruggedly built as CP Sinker Drills. You don't have to handle them with kid gloves or baby them on the job. But, you do have to give them reasonable care, and a few simple suggestions — like the four illustrated on this page — will help you to get maximum service from your CP-32, CP-42 and CP-10 Sinker Drills. Additional suggestions for the better maintenance of CP Sinker Drills will appear in future advertisements. Watch for them.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP SINKER DRILLS



1 Remove, clean air inlet screen every two weeks — more frequently if hose is old. Drill will lose power, if the air inlet screen becomes clogged.



2 Fill reservoir with good grade of oil of proper viscosity for weather conditions. If machine is used constantly, fill the reservoir every hour.



3 Before putting sinker drill in service, always connect the air hose and make sure oil is coming through the machine and out of the exhaust.



4 Blow air hose, connect to machine, turn on air and examine drill shank to see whether oil is going through working parts of the machine.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL  COMPANY

General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES



SERVICE in a hurry — that's what you get when your Allis-Chalmers dealer repairs or rebuilds your equipment. A recent example is this six-year-old Model WM, owned by J. A. Krusell, Waukesha, Wis. Hauled into the shop of an A-C dealer, Drott Tractor Company, for repairs one day . . . it was back rushing essential work the next! In less than a day's time a new gear, pinion and bearings were placed in a final drive . . . a steering clutch was rebuilt . . . new leaves were installed in the stabilizer spring . . . old-type rollers were replaced with a set of the new Positive-Seal truck wheels that require lubrication only once in 200 hours.

Busy as he is on war jobs, your Allis-Chalmers dealer is still taking good care of essential civilian

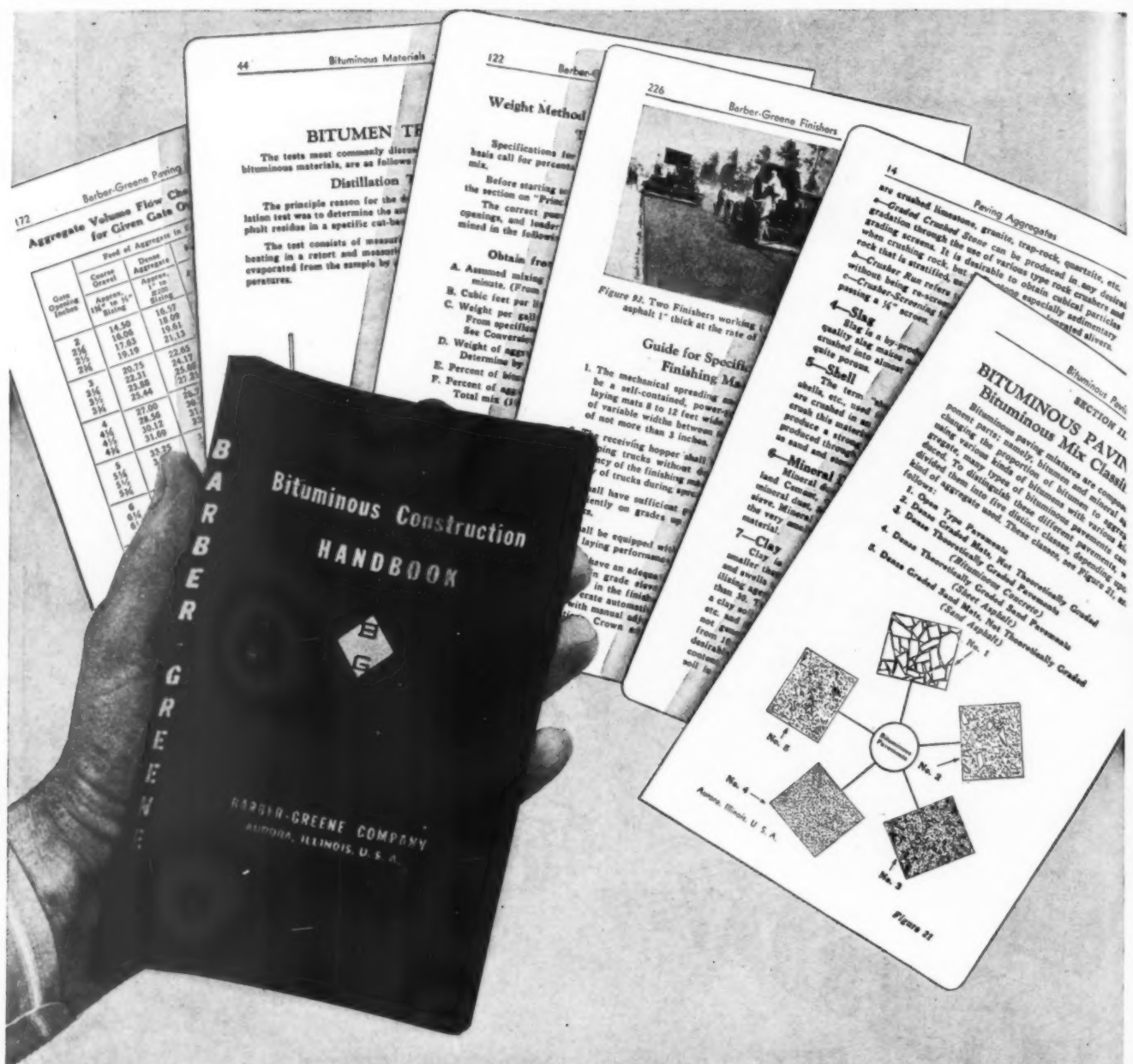
customers. Quick to change over to meet war requirements, he is set up to handle a large volume of work. Jobs go through in production line fashion — yet each is carefully supervised and handled. His staff of factory-trained mechanics know exactly what to do and how to do it — and have the right type tools to get it done in minimum time.

Next time you want a service job handled in a hurry, done right and at small cost . . . call your Allis-Chalmers dealer. You'll have your unit back on the job in no time—with many more hours of efficient performance added.



ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE, U.S.A.





Now Available

● For many years, Barber-Greene has published data on bituminous construction for its own engineers and servicemen. As this material was seen by others in the industry, many requests were received for such data. The compilation of this data into the B-G Bituminous Construction Handbook is the result.

The Handbook has been completely revised with this issue, greatly amplifying

the general engineering data. It is not a picture book or catalog. It is a compilation of material our organization has gathered through close contact with construction operations in this country and abroad.

The Handbook is now available (without charge) to contractors and engineers. Because of paper and material shortages, we hope only those having a definite need or interest in this field will request these Handbooks. Address your request to: Bituminous Equipment Sales, Barber-Greene Company, Aurora, Ill., U. S. A.

43-1

BARBER-GREENE

2 Ways to Increase the Output of Your LeTourneau Dozers

Doze in Slot or Work Two Dozers Side by Side to Step Up Yardage

Here are two operating tricks, which will enable you to increase Dozer yardage on earth-moving jobs. Try them with your LeTourneau Dozers on such work as:

Short haul excavation; shoving sand, gravel or ore to hoppers, conveyors or grizzlies; stripping overburden on short hauls; wasting spoil, especially in large banks; feeding material to shovels.

See for yourself how they increase the material you can handle without extra men or extra tractors.

Build Up Load by

"Slot"
Dozing



With a single Dozer you gain extra yardage by working in a narrow bowl-wide cut or "slot." Sides of cut act as side-boards, keep material from windrowing out the ends, and build up the load ahead.

Working Two Up

If you have two tractors equipped with LeTourneau Dozers, work them side by side whenever possible. The extra material which rolls along between the Dozer bowls will give you an extra yard or two each trip.

EXTRA PAY YARDAGE PER TRIP



LeTourneau Dozer feeds clay to portable trap for truck loading at Santa Fe Dam. Note how "slot" keeps material from windrowing and helps build up load.

Here operators make the use of LeTourneau Dozers side by side doubly effective by dosing several loads to the edge of the hill before starting trip down together.

Put these methods to work on your job. See how they make it possible to increase the yardage you can handle with your present tractors.

See Your LeTourneau—"Caterpillar" Dealer

If you need a LeTourneau Dozer or Power Control Unit to keep your tractor busy, ask your LeTourneau—"Caterpillar" dealer for help on WPB releases. He can help you with your service and repair problems, too. Make him your Victory Construction headquarters NOW.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

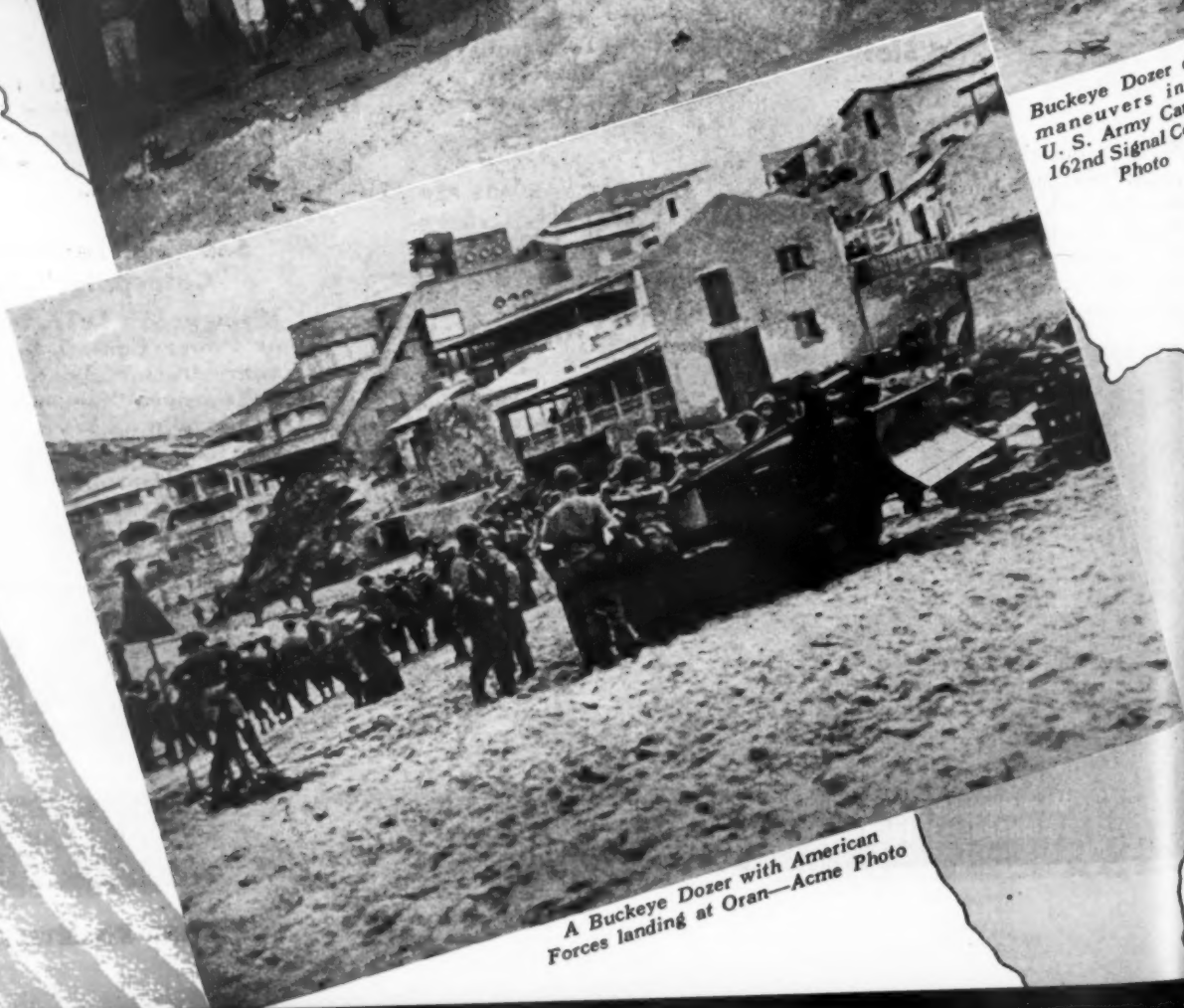
Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPES*, TOURNATRAILERS*, TOURNAWELDS*, TRACTOR CRANES. *Name Reg. U. S. Pat. Off.

ROADS AND STREETS, July, 1943

"An AMERICAN BULLDOZER



Buckeye Dozer on
maneuvers in a
U. S. Army Camp.
162nd Signal Corps
Photo



A Buckeye Dozer with American
Forces landing at Oran—Acme Photo

Improves a Tunisian Road



Acme Photo

IT'S a Buckeye—just as it is Buckeye on all the fighting fronts. Bulldozers are as much a part of mechanized warfare as tanks, guns, planes. The modern army division includes in addition to all its other mobile equipment, five bulldozers.

Primarily a tool of the Army Engineers, the bulldozer levels sites for airfields and camps, builds bridge ap-

proaches, grades roads, repairs bomb pocked terrain, does 101 other vital jobs.

Fast, responsive cable control; mold-boards that roll the dirt; engineered balance; battering ram construction — These are features that make Buckeye front line equipment for Uncle Sam.

There is no proving ground like a battleground. Your best buy will be Buckeye.

Check Page 8

BUCKEYE TRACTION DITCHER CO., Findlay, Ohio

Built by Buckeye

Convertible Shovels



Trenchers



Tractor Equipment



R-S Finegraders



Road Wideners



Spreaders





GENERAL

recommends the continued purchase of War Bonds and Stamps — and the observance of preventive maintenance to keep your machinery running.

GENERAL SUPERCranes Conserve Vital Fuel, Man-Power and Machinery

Powered by one motor and controlled by one man the SUPERCrane moves about freely on its pneumatic tires. Movement is much faster, with reduced wear on moving parts.

The
OSGOOD
COMPANY

Sizes: 1 to 2 1/2 Cu. Yd.
Diesel - Oil - Gas - Electric

Associated with
The GENERAL
EXCAVATOR CO.

The
HERCULES
COMPANY

HERCULES
IRONEROLLERS
6 to 12 Tons
Diesel or Gasoline

Associated with
The GENERAL
EXCAVATOR CO.

GENERAL

Sizes:

3/8 - 1/2 - 5/8 - 3/4 Cu. Yd.
Diesel — Gas — Electric



SHOVELS

DRAGLINES - CRANES
Crawler & Wheel Mounted

THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

There are more
MULTIFOOTE
PAVERS in SERVICE
than any other make!



ADNUN
BLACKTOP
PAVER

MULTIFOOTE
CONCRETE PAVERS

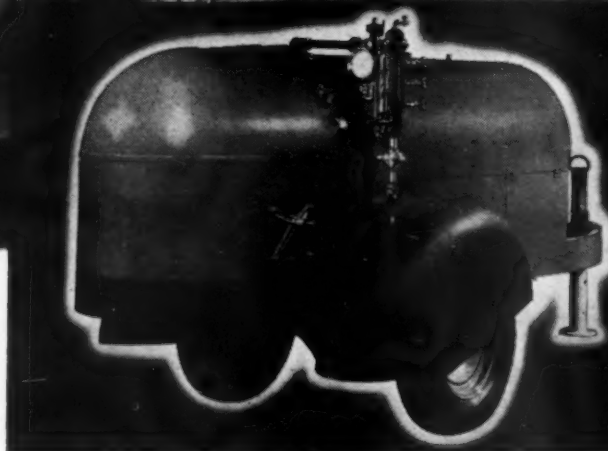
THE FOOTE COMPANY, INC.
Nunda • New York

The World's Largest Exclusive Manufacturers
of Concrete and Black Top Pavers

Like the **SPEED . . . MOBILITY
. . . FIRE POWER**



of a
**MODERN
FIELD-PIECE**



Rapid Heating of Oils and Bituminous Materials—On The Job, As Needed—Is A Certainty With CLEAVER-BROOKS Heaters and Boosters » » » »

Your crews are not delayed — there's no waiting for road oils or bituminous materials to be brought to application temperatures—when there is a Cleaver-Brooks Tank Car Heater or Booster on the job.

Haul it to the unloading siding by truck or passenger car. Hot, dry steam will flow to the car heating coils in 25 minutes — with every foot of the car coils constantly working because of the exclusive Cleaver-Brooks dry-coil method of condensate return. You do away with the "water wagon" problem as every drop of condensate is returned to the tank car heater under pressure. High-speed, eco-

nomical performance is due to the original and exclusive Cleaver-Brooks four-pass down-draft flue travel and integral burner construction plus the positive dry-coil method of condensate return.

Cleaver-Brooks Tank Car Heaters are built in two and three tank car sizes — Portable Pumping Boosters in two capacity sizes, with truck mounting or 4-wheel trailer.

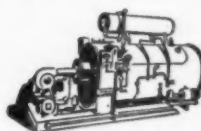
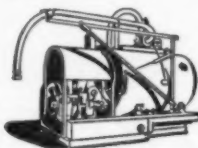
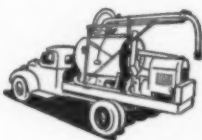
Write for complete information.

CLEAVER-BROOKS COMPANY
5106 N. 33rd STREET • MILWAUKEE 9, WISCONSIN

Cleaver-Brooks



TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS



BLACK

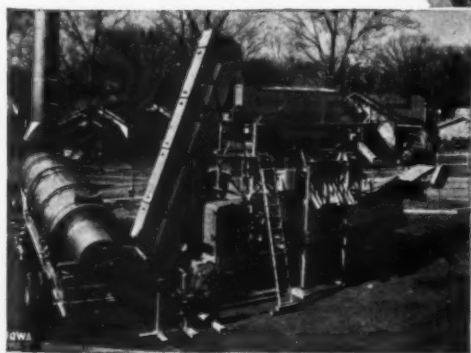
MAGIC

Cedarapids

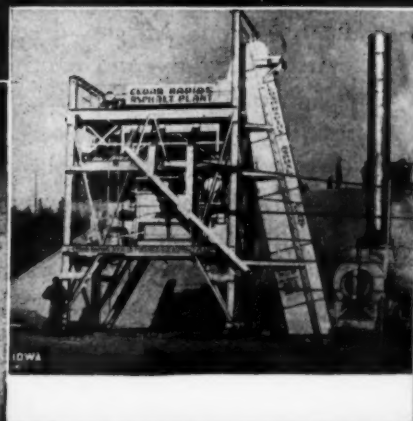
Built by
IOWA

**for KOSS
CONSTRUCTION
COMPANY**

Des Moines, Iowa



*A Capacity for
every problem*



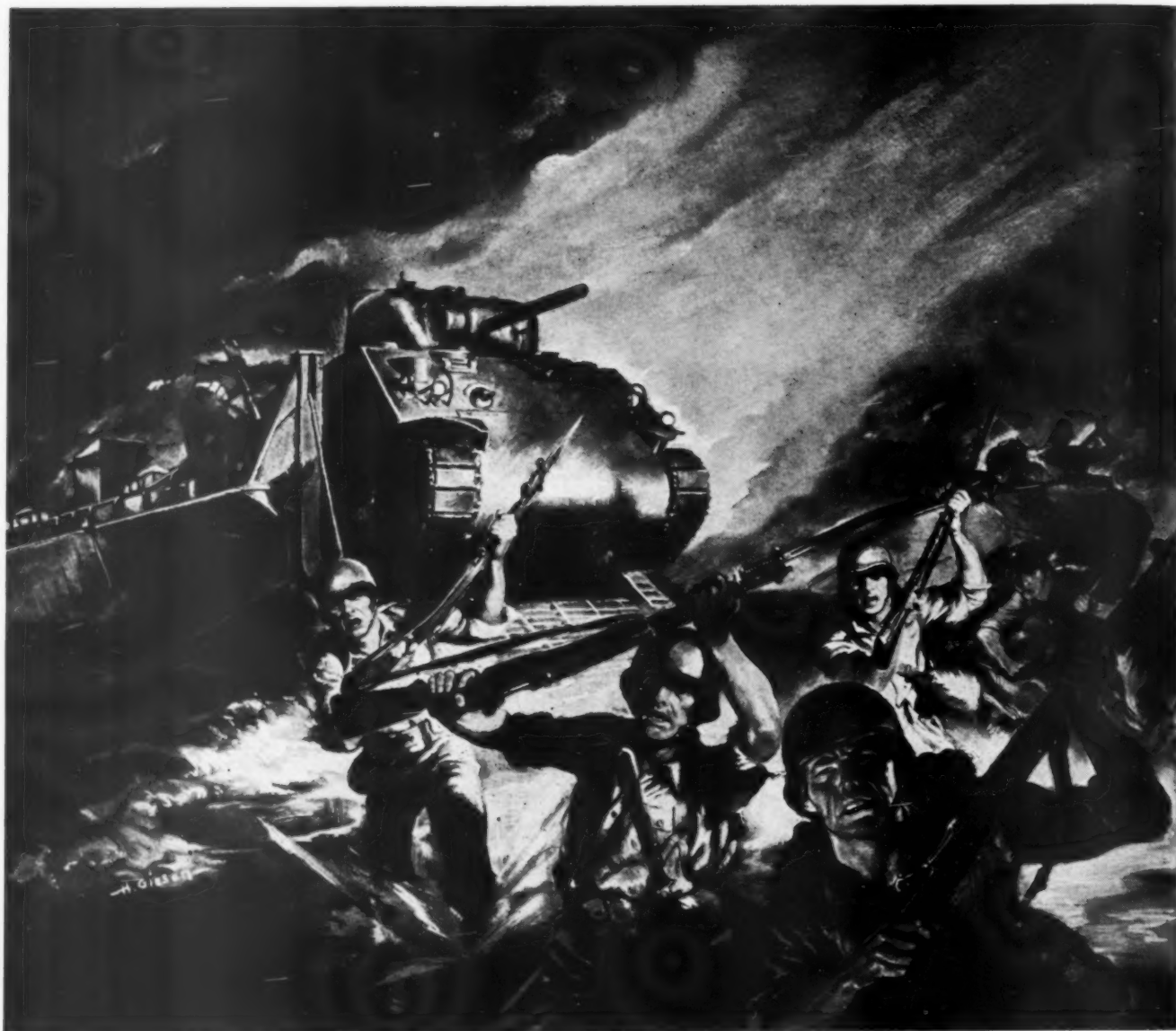
THERE is a rumble through the night. The headlights of another truck stab the darkness that envelops the stock piles by the railroad tracks. It rattles empty under the discharge to take its batch of sticky black top and it rumbles heavily away again with several square yards of airport runway in the raw, mixed and produced by American ingenuity as typified by Iowa Cedarapids Asphalt Plants.

Hour after hour, through the night and day, the trucks rattle up and rumble away and the ribbons of black runway roll out behind them. 53,000 tons in 44 days operating two 10 hour shifts a day — at an average of 85 tons an hour. That's the kind of service this Cedarapids Asphalt Plant gave Koss Construction Co., of Des Moines, Iowa at Perry, Oklahoma.

That's the kind of service Cedarapids asphalt plants are giving all over the country.

There is a time coming when we will again be a free people — free to come and go and enjoy the natural richness of a great nation. It will call for highways, airports, dams and buildings. People are going to go places. When that time comes the dependable wartime service that Iowa Cedarapids plants give can be the difference between successful and unsuccessful contracts. Come to headquarters for aggregate producing equipment.

IOWA MANUFACTURING COMPANY
Cedar Rapids,
Iowa



IT'S A TOUGH PROVING GROUND

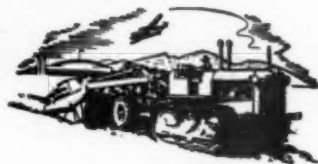
THERE'S hardly a General Motors wheel that isn't whirling exclusively for war.

Yes, the heat's really on. And while we can't tell you how many engines we're building, we can say this. You can find General Motors Diesels from African deserts to Burma jungles—and on the seas between. They're in tanks, trucks, landing and patrol vessels, tractors and many other tools of war.

And although our plants have been greatly expanded, and we're making these engines at many

times the prewar rate, they're still asking for more.

War's a hard taskmaster and a tough proving ground. But when the war is won, these enlarged production facilities for war's demands will mean more economical power for a better peacetime world.



Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.



ENGINES . . . 15 to 250 H.P. . . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES . . . 150 to 2000 H.P. . . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES ELECTRO-MOTIVE DIVISION, La Grange, Ill.

THIS NEW CLUTCH

BRINGS THESE
12 ADVANTAGES

TO MANUFACTURERS OF



1. Simple in design and operation
2. Flexible control by air
3. No adjustments or oiling—low maintenance
4. Dampens vibration—absorbs shocks
5. Corrects misalignment automatically
6. Smooth starting—no jerks
7. Runs cooler—uniform pressure
8. Controls torque by air pressure
9. Greater capacity—more compact
10. Remote control by air valve
11. Replaces flexible couplings
12. Acts as clutch, slip-clutch, brake and coupling.

Heavy-duty Diesel drives, steel mills, presses, power shovels and cranes, oil-field equipment, compressors, hoists, motor generator drives, power take-offs—any heavy-duty service.

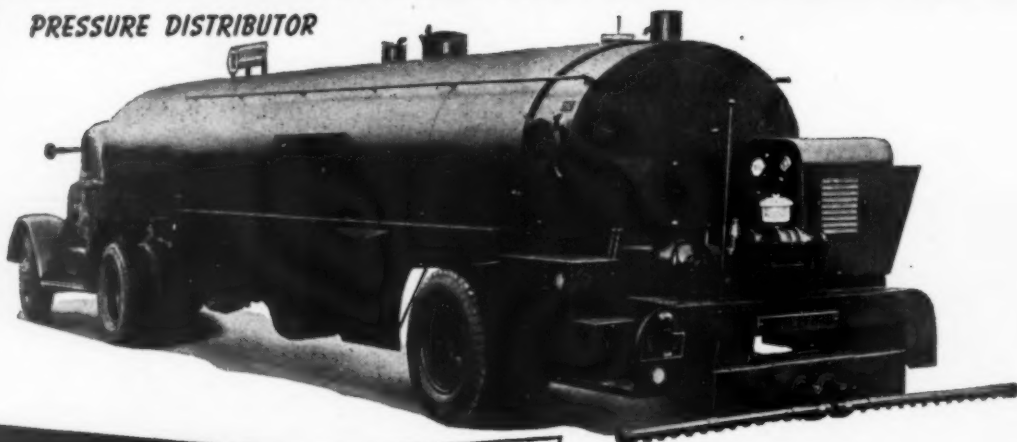
Many hundreds of AIRFLEX Clutches are in service in Diesel-powered Naval and Merchant Marine vessels.

You are invited to write for information to
FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Road Cleveland, Ohio

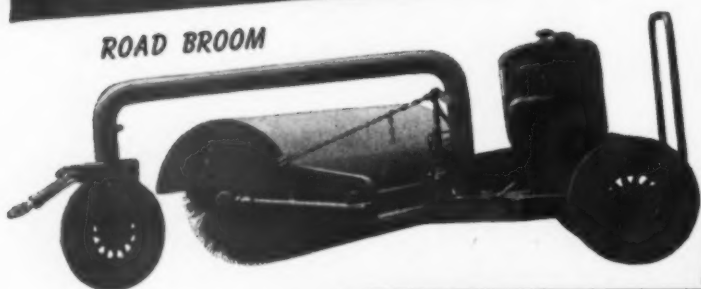
FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

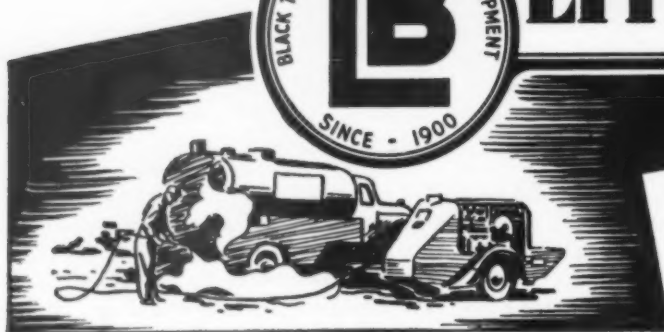
PRESSURE DISTRIBUTOR



ROAD BROOM



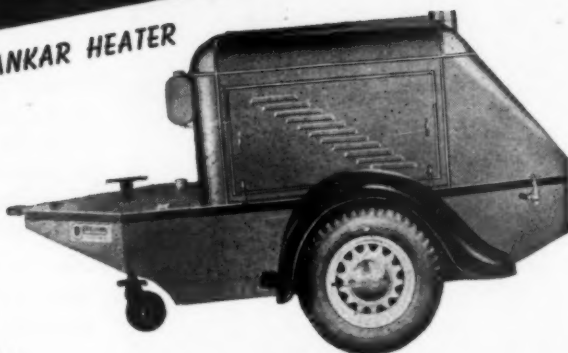
LITTLEFORD



SUPPLY TANK



TANKAR HEATER



BLACK TOP ROAD MAINTENANCE EQUIPMENT

The Littleford Trade Mark is in the fight, building and maintaining Airports, Highways, Roads, Barracks and Cantonments. Doing a job to help bring an early peace. After Victory, the Littleford "Trade Mark" will again help to make this world a better place in which to live. Littleford since 1900, has produced Black Top Construction and Maintenance Equipment, and is NOW proud to have the chance to produce for Victory.

LITTLEFORD BROS., INC., 454 E. Pearl St., CINCINNATI, OHIO

BATCH-CYCLE SPEED

CUTS POURING TIME

THESE **3** OPERATIONS
REDUCE BATCH-
CYCLE TIME ...



Wide, Flow-Line, Quick Charging Skip Saves Seconds.



Air Controlled Discharge Chute is Positive, Quick Acting.



Twin-Door, Large Opening Bucket Dumps and Spreads at High Speed.



MAXIMUM YARDAGE KEEPS JOB MOVING

... Concrete slab jobs, today ... airports, military highways and access roads ... must be poured at top speed ... men, equipment and materials ... all striving to one end ... smooth concrete highways and runways ... in the shortest possible time. Koehring Paver batch-cycle speed helps meet production schedules. Batch-cycle is controlled by three important operations ... charging, discharge and spreading. Koehring skip charges drum at high speed ... drum interior quickly shrinks material ... twin-door bucket spreads concrete without clogging delay. All operations are accurately and automatically batch-meter timed for maximum production.

KOEHRING COMPANY, Milwaukee, Wis.



HEAVY-DUTY CONSTRUCTION EQUIPMENT



Spreading cement for salvaging old street in Wisconsin.



Putting finishing touches to newly compacted soil-cement patch which soon will carry traffic.



Mixing soil and cement on shoulder widening project in South Carolina.

Right half of old gravel road in Nebraska salvaged by soil-cement process.

SOIL-CEMENT economical for Wartime Maintenance



Soil-cement is meeting the requirements of rigid economy essential to wartime salvaging, maintenance or widening of old roads and streets carrying light traffic.

Rundown sections of secondary or intermediate highways and streets needed for wartime traffic can be salvaged and restored to usefulness by processing the failed areas with soil-cement, using available maintenance machinery.

Light traffic roads which are now dangerously narrow can easily be widened with soil-cement shoulders.

Patch maintenance too is simple with soil-cement. Patches made with soil-cement "stay put."

Four-page illustrated data sheet (No. SCB-6) based on field experience will be mailed free to aid engineers in wartime salvaging and maintenance operations with soil-cement.

PORTLAND CEMENT ASSOCIATION, Dept. A7-28, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY MORE WAR BONDS

ROADS AND STREETS, July, 1943



VICTORY
assured by

WORK IN INDUSTRY

All forces of the United Nations must be fully armed and equipped to win the fight! A continuous flow of supplies must keep up with the advancing armies. War and industry are inseparable. War consumes tremendous quantities of materials and equipment. And industry must supply these needs. Victory in battle and Victory in industry call for a far greater cooperative effort than ever before. Industry can assure Victory through Work! Fighting Men need Working Men!

Gar Wood Industries, Inc., knows the only job now is to win the war—to keep producing more every day—to keep pace with the urgent demand for more production to insure Victory.

Gar Wood Industries, Inc., has been rendering continuous service for more than a quarter of a century—in peacetime and in wartime—and was one of the first manufacturers to convert its various plants into war production. Today all Gar Wood plants are turning out

war equipment. Included among the diversified Gar Wood products are Gun Mounts, Barrage Balloon Winches, Wire Reels, Troop and Cargo Bodies, Mobile Machine Shop Bodies, Truck and Trailer Equipment, such as Dump Bodies and Hydraulic Hoists, Winches, Cranes, Derricks, Refueling Tanks and Water Tanks—Road Machinery, including Scrapers, Bulldozers, Roadbuilders, Tamping Rollers and Rippers—also Heating Equipment and fast, powerful Boats for the Army and Navy.

One of Gar Wood Industries' latest and timely contributions is the automatic, all-enclosed Load-Packer, outstanding for its conservation of men, trucks, tires and gasoline by reason of its hydraulic compressing action packing greater loads of garbage and rubbish than any other type of collection body.

Write for illustrated literature about these wartime products.

OUR ONLY JOB now IS TO
WIN THE WAR

*Protect
Freedom
BUY WAR
BONDS*

GAR WOOD INDUSTRIES, INC., Detroit



Finding Paul is My Business

● As chief test driver, it's my job to test and make sure every Ward LaFrance special truck is *right* in every respect when it leaves our plant. Each one gets a work-out of a hundred miles or more under full load. When my crew says "okay" we have mighty good reason to believe that each Ward LaFrance will more than live up to its name.

Individual testing under load is one of the many unusual extra steps taken to be sure every Ward LaFrance truck will do the specialized job for which it was designed. When replacement of your present fleet becomes possible, consider how much extra economy and performance you can expect when you fit the truck to the job, instead of fitting the job to the truck.

Use the services of an organization with twenty-five years' experience in the design and construction of special motor vehicles.



Tank-Recovery Wrecker Unit, now in production for the Army, loaded with 20,000 lb. concrete block for its test run.

One of a fleet of special Ward LaFrance trucks built for the Department of Sanitation, New York City.

WARD LaFRANCE

TRUCK



DIVISION

ELMIRA, N. Y.

© 1943 Great American Industries, Inc., Meriden, Conn



Another
LIMA
feature

TRAVEL and BOOM UP or DOWN

HOIST, SWING,

ALL AT THE SAME TIME

Today when we are working to hasten Victory it is important that we use every known means to speed up the handling of material vital to our war effort. To this end LIMA cranes of 20 tons capacity and larger, which will hoist, swing, travel and boom up and down at the same time are great time savers. Simultaneous operations speed up production because there is no lost time changing from one motion to another. Loads are spotted quicker, machine can work in much closer quarters and less frequent moves are necessary. These advantages should be considered when you have a job that requires speed and precision. Make your next shovel, crane or dragline a LIMA, and get a machine that has won the indorsement of those who are doing the big jobs.

LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division

LIMA, OHIO

NEWARK, N. J. NEW YORK, N. Y. DALLAS, TEXAS PORTLAND, ORE. SEATTLE, WASH.
SPOKANE, WASH. SAN FRANCISCO, CALIF. LOS ANGELES, CALIF.
PHILADELPHIA, PA. MEMPHIS, TENN.

**SHOVELS
CRANES
DRAGLINES**

LIMA

SHOVELS, $\frac{1}{4}$ YD. TO $3\frac{1}{2}$ YD.

CRANES, 13 TONS TO 65 TONS

DRAGLINES, VARIABLE

WIRE FABRIC REINFORCED CONCRETE ROADS



Proved by the punishing loads of war

AMERICA'S concrete roads were made to take it. Reinforced with wire fabric, they have the extra strength to resist the combined destructive forces of heavy loads and subsoil movements.

The real test came when America went to war. Huge tanks and guns rumbled over highways that before knew only the loads of commercial traffic. Increased highway hauling with trucks loaded with heavy war goods subjected these roads to unusual burdens. These trying conditions have proved the soundness of reinforcing concrete roads with wire fabric.

Wire fabric adds years to the life of highways. Cracks that may form are structurally harmless because the closely-spaced, high-yield-point reinforcing steel controls the crack by holding the faces of adjoining slabs formed by the crack in tight interlock. This enables the two crack edges to deflect simultaneously, rather than independently—thus preventing the concrete from becoming overstressed.

Safeguard the concrete highways you design. Lengthen their life, and protect the public's investment, with wire fabric reinforcement.

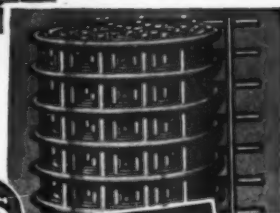
AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

*Columbia Steel Company, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York*



Furnished in sheets to fit slab dimensions — also available in rolls.



**AMERICAN
WELDED WIRE
FABRIC**

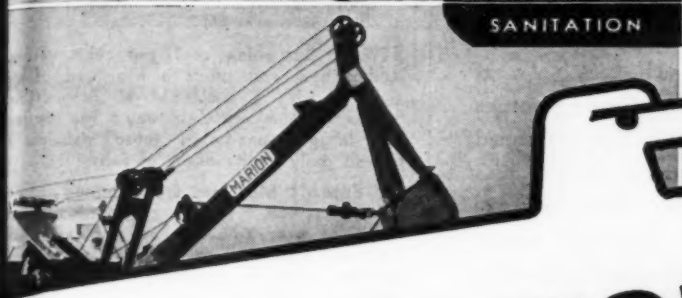
UNITED STATES STEEL



AIR FIELDS
SANITATION



WAR PLANTS
BRIDGES



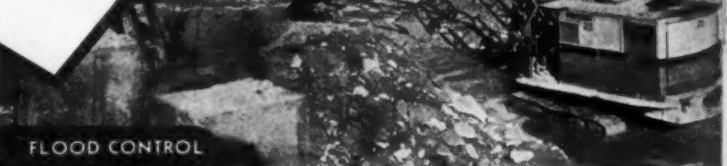
WAR WORKERS *without Let-Up*

If citations were in order for material handling equipment, MARIONS would be decorated generously for their dependable, round-the-clock performance since war was declared. It is this extra stamina and extra power built into MARION machines, proven beyond doubt during this emergency, that have earned for them a dominant place in the post-war world.

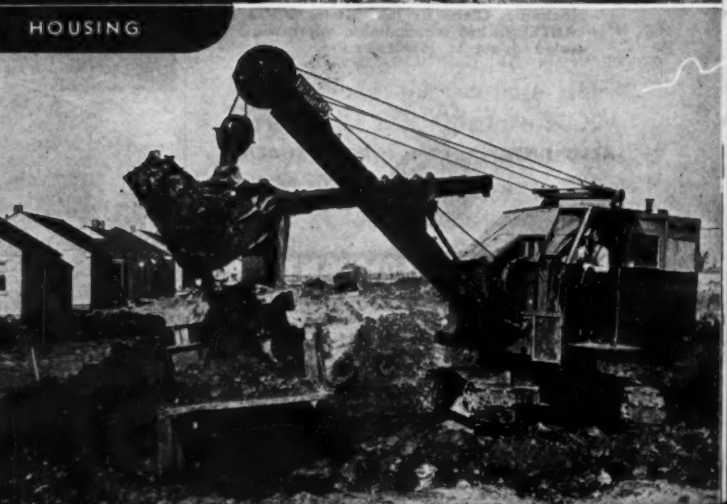
The **MARION**
STEAM SHOVEL CO. ★ MARION, OHIO
SHOVELS ★ DRAGLINES ★ CLAMSHELLS
CRANES ★ PULL-SHOVELS ★ WALKERS
From 3/4 cu. yd. to 35 cu. yds.

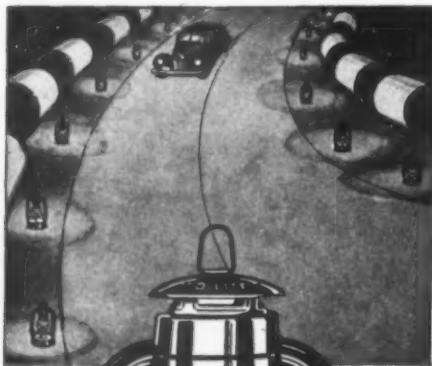


ARMY CAMPS
HIGHWAYS



FLOOD CONTROL
HOUSING





RED for Light and SAFETY



RED globe DIETZ Lanterns mean "DANGER—STOP." No other signals or devices so instantly and obviously evoke caution, guide to safety, and prevent needless accidents.

For safety's sake, keep available a good supply of DIETZ LANTERNS with wicks trimmed, and founts filled with inexpensive kerosene... ready for service the moment sudden emergencies arise.

DIETZ LANTERNS burn long hours at a time without diminishment under the most severe conditions.

Note: For diminishment of light during blackouts, Clear or Red Globe DIETZ LANTERNS are recommended when regulated down to low intensity.



ALSO DIETZ

ROAD TORCHES

R.E. DIETZ COMPANY
1840 NEW YORK 1943

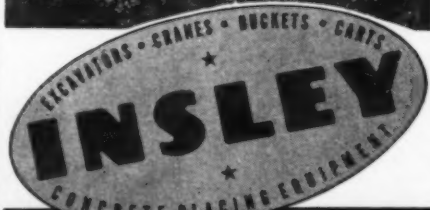
Output Distributed Through the
Jobbing Trade Exclusively.

ROADS AND STREETS, July, 1943



These are the badges of America's modern fighting forces... the qualities that will speed victory on land, on the seas and in the air. These, too, are the badges of Insley equipment... the qualities demonstrated for 35 years on construction jobs the world over...

... the qualities which have caused Insley production to be drafted 100% for essential war jobs.



INSLEY MANUFACTURING CORP.
Indianapolis, Indiana

MOVE MORE YARDS PER DOLLAR

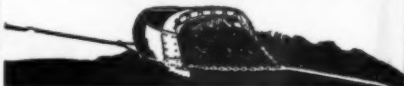


It costs but a few cents per cubic yard to dig, haul and place a big load of any material with a SAUERMAN Power Drag Scraper or Slackline Cableway. The low cost and large capacity of these machines is proved daily on hundreds of jobs.

SAUERMAN Machines are designed in suitable sizes and types to cover the requirements of every dig-and-haul job and each machine, whether large or small, offers the greatest possible economy of power and labor.

Write for Catalog

SAUERMAN BROS., Inc.
588 S. Clinton St., Chicago



EASILY



WELDED

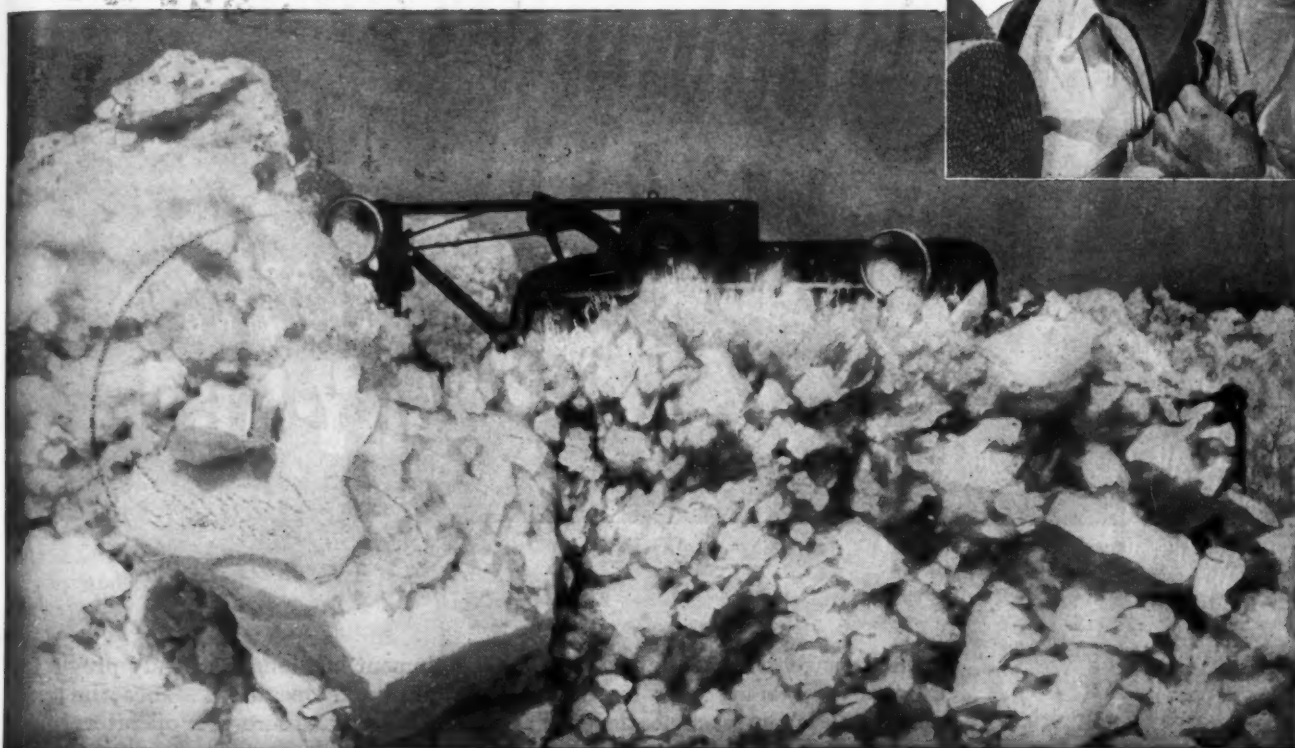
Send for Catalog R

Inquiries invited from
Dealers and Salesmen

ALLIED STEEL PRODUCTS, INC.

N.B.C. BLDG.
CLEVELAND, OHIO

90 Degrees in the Shade, Today ...but a BLIZZARD is on the WAY!



Walter Snow Fighters

WHILE you are mopping your brow, don't forget that within four months a blizzard can "turn on the heat" for your highway department.

Prepare now for the worst that winter can bring. Equip with Walter Snow Fighters—designed and built for snow removal. They have the super-traction of Walter Four Point Positive Drive, with the power

proportioned to each wheel according to its traction by 3 patented Automatic Lock Differentials. This tremendous four-wheel power and traction enables Walter Snow Fighters to blast through towering drifts—to travel over icy surfaces—to keep going under conditions that stop other types of equipment.

It is none too soon to consider your next winter's snow removal equipment, in view of uncertainties in wartime delivery. Write for literature NOW, detailing the many advantages of Walter Snow Fighters. Get your order in early to insure readiness when the first snow flies.



WALTER MOTOR TRUCK CO., 1001-19 IRVING AVE., RIDGEWOOD, QUEENS, L. I., N. Y.

ROADS AND STREETS, July, 1943

10 COMMANDMENTS FOR LONGER *not forgetting*

HAZARD'S
ENDURING
LAY-SET

Preformed

Conserve steel by making every piece of equipment last longer. Steady production by keeping your machines in uninterrupted operation. Since the operation of your machines depends upon wire rope, make sure your operators keep these commandments:—

- 1 Inspect, clean and lubricate all wire rope regularly. Tighten fittings.
- 2 Be sure the rope is the proper one for the service. Ask your Hazard wire rope man.
- 3 If drums or sheaves are small, or the kinking tendency pronounced, specify LAY-SET Preformed, the rope that resists bending fatigue and kinking.
- 4 Check your sheave or drum grooves. Worn grooves play havoc with wire rope.
- 5 Don't let rope rub against any standing part.
- 6 If the rope deviates from the center plane of the sheave more than $1\frac{1}{2}$ degrees, undue wear will result.
- 7 Keep sheaves aligned and bearings tight and properly lubricated.
- 8 Don't allow bad spooling on drums. Hazard LAY-SET Preformed spools evenly under most conditions.
- 9 Don't jam on power or brake. Jerky operation accelerates rope failure.
- 10 Don't let a load spin and twist the rope.

Get the experienced recommendations of a Hazard wire rope man. Specify Hazard LAY-SET Preformed for a rope that resists bending fatigue, kinking and snarling. Use LAY-SET because it spools better, is faster and safer to handle, lasts longer.

Keep equipment in good condition. Make it last longer.

HAZARD WIRE ROPE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles,
New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

HAZARD **LAY-SET** *Preformed* **WIRE ROPE**

ROADS AND STREETS

July, 1943, Vol. 86, No. 7

Cement-Treated Base *plus* Plant Mix

40-mile contract job follows path of
historic Western pioneer road

"EL CAMINO REAL," The King's Highway which linked the early California Missions as marked by bell guide posts, has been reestablished between Bradley and King City via Jolon during the past year by the construction of 40 miles of highway under the the California Division of Highways.

Beginning near Hames Creek Bridge on U. S. 101 about 2.5 miles north of Bradley, the new highway follows generally the existing county road, but with standard alignment and grade, for about 22 miles northwesterly to Jolon, thence 18 miles to a junction with U. S. 101 on the west bank of the Salinas River near King City. This route is 6.3 miles longer

By A. N. LUND

Asst. Dist. Construction Engineer, California
Division of Highways, San Luis Obispo

than the Coast Highway which follows the Salinas River.

Jolon, a small settlement consisting of store and postoffice, church and remains of adobe hotel, is situated on Jolon Creek, a tributary of the San Antonio River, in the midst of grain and cattle ranches, surrounded by mountains of the Central Coast Range of which Junipero Serra Peak, 5853 ft. in altitude, is the highest. Mission San Antonio de Padua founded on July 14, 1771, lies six miles westward. Three miles to the south on Rancho Los Ojitos, stand two adobe buildings thought to have been erected in 1778,

one of which is reputed to be the oldest dwelling in California.

The project was divided into five units for construction. The first, about 10 miles long and extending through Jolon, was undertaken by the WPA in May, 1941. The balance of the project was contracted in units of 5.9, 13.1, 3.9, and 8.5 miles, awarded to Louis Biasotti and Son; N. M. Ball Sons; Brown, Doko and Baun; and Basich Brothers, respectively. Contract work began in March, 1942. N. M. Ball Sons also contracted to complete certain work left when WPA suspended early in 1942, their contract including completion of borrow, cement-treated base, plant-mixed surfacing and the construction of the Jolon Creek bridge. A contract for

Two 12-ft.-boxes, one slightly in advance of other, were used to spread cement treated base material on one section served by two treating plants. See text for other details. (N. M. Ball contract)

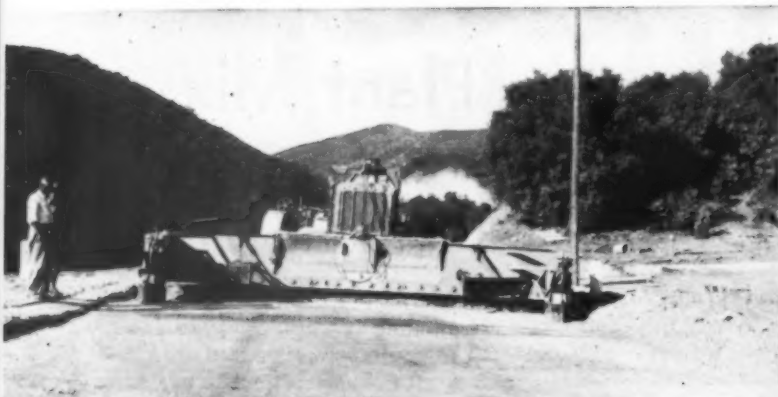




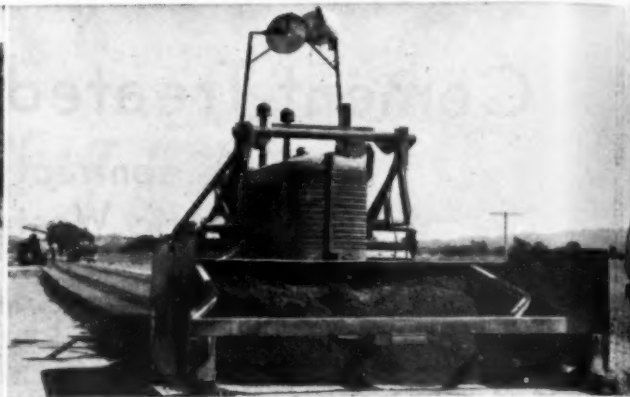
Note dry consistency of base mix, which had moisture content of 7 to 10% of dry weight of materials. (Brown, Doko & Baun)



Most of the necessary borrow was brought down by scrapers and dozers. (Basich Bros. contract)



A 24-ft.-wide box for spreading cement base was preferred by Basich Bros.



12-ft.-wide spreader boxes spreading cement base mixture. (N. M. Bell Sons job)

seal coat was awarded to Brown, Doko and Baun.

Roadway Design

The design, which was essentially the same throughout the project, provided for a subgrade of material having a minimum bearing value of 20 per cent as measured by California standards; 24x0.5-ft. cement-treated base; 22x0.25-ft. plant-mixed bituminous surfacing; 8-ft. shoulders with penetration application of liquid asphalt; gutters and berms lined with plant-mixed surfacing, and a seal coat for the entire width of the roadbed.

An exception was made to this design on a 2.4-mile section of heavy sidehill construction over the summit north of Jolon, where the shoulders were given a 3x0.25-ft. plant-mixed surfacing.

Due to curtailment in reinforcing steel, reinforced concrete construction was held to a minimum. Twelve unreinforced concrete arches were constructed varying from 5 to 8 feet in width and height, for drainage and cattle passes.

Parallel Creek Carried Over Check Dams

An unusual feature of design provided for the construction of 25 check dams to prevent erosion. The new highway on a 2-mile section follows along Hames Creek in a comparatively narrow canyon and it was necessary to confine the creek in a channel

parallel to the highway. On account of the friable nature of the soil and the excessive channel grades, check dams were constructed of lean concrete in order to maintain the channel grade at a minimum of one per cent. These check dams functioned satisfactorily during the recent winter storms.

Drainage Under Fills

Across the marshy areas to the east of Jolon, the soil formation consisted of about three feet of loosely compacted shale and clay soil overlying an impervious strata. In advance of constructing embankments, longitudinal side ditches with 10-ft. bottom and 2 to 1 slopes were excavated under the toe of each slope and connected by transverse trenches of the same dimensions at intervals of not more than 400 ft. After allowing the embankment area to drain, the transverse trenches were backfilled with pervious gravelly material. In this manner subsurface drainage above the hardpan is intercepted and carried away by the transverse bleeder trenches and side ditches. Wherever possible cross-drainage culverts were placed with flow line at hardpan elevation which in some cases necessitated outlet ditches up to 1000 ft. in length.

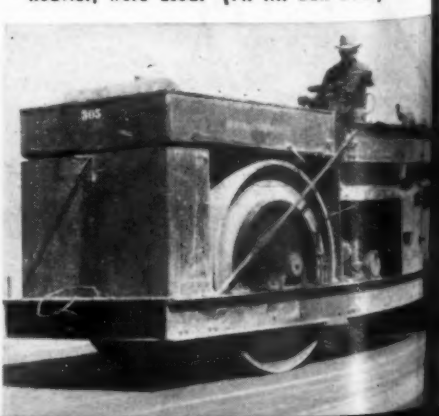
Grading Was Easy

Excavation was largely in shale and soil cuts which did not require



A water tank truck with atomizing spray and pneumatic roller was used on the cement treated base

Three-wheel tandem rollers, 10 tons or heavier, were used. (N. M. Bell Sons)



s brought
sich Bros.



Placing asphaltic emulsion curing seal on base. (Louis Biasotti job)

ement
job)



Feeding cement to dust elevator at Biasotti's treating plant

spray
n the



One of the combined cement base and bituminous-mix plants. (Brown, Doko and Baun contract)

ns or
ons)



Beginning of cement-treated base project (road at left)

blasting. The greatest difficulty was due to the saturated soil conditions encountered in spring. Grading was done principally with tractors, dozers and scrapers aided by power shovels, draglines and trucks for the longer hauls of selected material and imported borrow. Embankments and subgrade were given a minimum relative compaction of 90 per cent with sheep-foot and 3-wheel rollers.

Cement-Treated Base

Five plants, each consisting of a portable crushing and screening unit and hot plant with either a 3,000 or a 4,000-lb. pug mill, operated concurrently in the production of cement-treated base and plant-mixed surfacing. Of these plants, one employed a bulk cement silo with manually controlled weighing and batching, while the others used sacked cement. In all cases cement was proportioned separately by weight and delivered to the plant weigh-box by way of the dust elevator. Mineral aggregates from local materials were proportioned by weight but were not heated for the production of cement-treated base except for a short period at the beginning of operations. Heating was discontinued when it was found that

compression breaks of test cylinders were lower than specification requirements.

Specifications Required:

1. Aggregate grading with 100% passing 1-in. sieve, 85% to 100% passing $\frac{3}{4}$ -in., 40% to 65% passing No. 4 sieve, 15% to 43% passing No. 16, and 0% to 8% passing No. 200.

2. Mineral aggregate to be of such quality that when mixed with portland cement in the amount specified and compacted with optimum moisture content, the compressive strength of the mixture shall not be less than 850 lb. at 7 days, nor less than 1000 lb. at 28 days.

3. A cement content varying between 7 and 9 per cent of the dry weight of the base material.

4. 95% relative compaction of the base material in place, as compared with the average dry weight per cu. ft. for the material used as determined from the fabrication of test cylinders.

5. Minimum mixing period of 45 sec. with all materials in the mixer.

6. Finished surface varying not more than $\frac{1}{2}$ in. in 10 ft.

7. Operating time limit of two hours from the beginning of mixing

Placing slope paving on banks of Hames Creek. (Louis Biasotti)



to the completion of compaction and surface.

Test cylinders for determining the compressive strength of the material were 4-in. diameter by 4 in. height and compacted in a mold under a pressure of 2000 p.s.i.

Cement-base Procedure

In advance of placing the base mixture, the subgrade was shaped and compacted with a recessed section of the base dimensions, and shoulders compacted to the elevation of the top of base. The mixed base material was hauled in tarpaulin covered trucks in order to prevent loss of moisture. Moisture content of the mix varied between 7 and 10 per cent of dry weight of aggregate plus cement, depending on grading, material used and air temperature.

The base material was spread on the subgrade in the amount required for full thickness by means of a spreader box attached rigidly to a tractor bulldozer. The width of the box was generally 12 ft. to spread $\frac{1}{2}$ width, except that on one contract a full-width box of 24 ft. was employed. The latter was very satisfactory except for one disadvantage of adjusting the strike-off blade in changing from tangent to curve section and vice versa.

In using a 12-ft. box, about six loads were spread first on half of the subgrade, followed by a like number on the opposite side. During a period when the output of two plants was being hauled to one location, it was found advantageous to use two 12-ft. spreaders, one slightly in advance of the other. Immediately following the spreading operation, the base mixture was rolled to the required compaction with a 10-ton (or heavier) 3-wheel roller.

The surface was then trimmed with a motor grader to the required smoothness, finish-rolled with a pneumatic roller, and sprinkled with a fine spray of water during rolling to form a dense smooth crust on the surface.

Placing of a curing seal of asphaltic emulsion, at about $\frac{1}{2}$ gal. per sq. yd., completed the operation of cement-treated base construction. On account of the small amount required, the curing seal was ordinarily placed by means of a hand spray. These operations indicated that the best results for compaction of base in place and for smoothness of surface are obtained with uniform plant production and spreading followed by prompt rolling. A fast, heavy roller and a skilled operator are especially important.

Field laboratory control for each shift consisted of two compaction

tests and the fabrication of four test cylinders. For two cylinders, material was obtained at the plant; for the remaining two, material from the job was used. Observations indicate that a 6-in. thickness of base is the maximum which can be constructed satisfactorily with the equipment used, as proper compaction is not obtained with greater thicknesses. The average compressive strength indicated by test results was approximately 1300 lb.

Surfacing Details

Specification requirements provided that cement treated base be covered with plant-mixed surfacing 12 days after placing, and therefore all plants operated alternately in the production of base and surfacing materials, the plants being so arranged that only a short period of time was required for the change. Liquid asphalt ROMC-5 was specified and used in plant-mixed surfacing until the supply was restricted, following which liquid asphalt of MC-5 was substituted. All surfacing materials were spread in two courses of about equal thickness by means of motor graders. To facilitate the construction of berms and

gutters, an attachment for a motor grader was utilized which was capable of shaping, spreading and compacting the plant-mixed surfacing with much neater results than could have been obtained by hand methods.

Due to the late season in which it was necessary to place seal coat, liquid asphalt MC-5 was substituted for asphaltic emulsion as specified. An application of 0.2-gal. per sq. yd. was made to the central 22-ft. and covered with about 20 lb. of No. 4x10 screenings. For shoulders, gutters and berms the application of asphaltic binder was at the rate of .25 gal. per sq. yd. covered with about 27 lb. of $\frac{3}{4}$ xNo. 6 screenings. Very satisfactory results were obtained considering that this work was performed during December and January.

With the exception of grading and structures on a nine and one-half mile section which was performed by WPA forces, all construction of the 40-mile project was completed in the 10-month period between March, 1942, and January, 1943. F. R. Pracht and V. E. Pearson were resident engineers for the California Division of Highways.

Amer. Soc. C. E. Post War Committee Formed

An important new Committee on Post War Construction has been formed by the American Society of Civil Engineers. Headed by G. Donald Kennedy, vice-



G. Donald Kennedy

The Committee's function, according to the Society's Secretary, George T. Seabury, is essentially that of providing leadership for a nation-wide acceptance of the principle that useful public works, as well as private construction, will be needed to alleviate unemployment in the post-war period.

According to Mr. Seabury the Board of Direction of the Society has been reluctant, during the period of preparation for war, to press for the present planning of post war construction. Now, however, that construction in the United States has diminished, it is believed that men are available whose capabilities could be put to no better use than that of the

present planning of construction projects that can be undertaken immediately upon the close of hostilities.

In addition to Chairman Kennedy the committee personnel includes Adolph J. Ackerman, Dean G. Edwards, Frederick H. Fowler, Gustav J. Requardt, and Frank T. Sheets.

Mr. Ackerman, member of the executive committee of the Society's Construction Division, is director of engineering for the Dravo Corporation, Pittsburgh, Pa.; Mr. Edwards, a Society director (dist. 1) is consulting engineer for the Borough of Manhattan, New York City; Mr. Fowler, A.S.C.E. past-president and recently elected president of the Society of American Military Engineers, is a consulting engineer familiar with all types of West Coast projects. Mr. Requardt, also a Society director (dist. 5), is a consulting engineer in Baltimore, Md. Mr. Sheets, former chief highway engineer of Illinois, is president of the Portland Cement Association.

Proceedings Highway Research Board Ready July 15

The Highway Research Board, 2101 Constitution Ave., Washington, D. C., has announced that the Proceedings, containing papers and reports presented at the 22nd annual meeting, St. Louis, Mo., December, 1942, will be ready for distribution about July 15. Price is \$3.25.



The paver on the Ohio route 14 job, though modern, is really a veteran, having placed 40,000 tons of hot-mix on the Lockburn air base in Ohio last year

Hot-Mix Resurface Contract

Ohio Improvement Co. job typical of state-wide pavement salvage program

By W. H. MOORE

Division Engineer, Ohio Department of Highways,
Ravenna

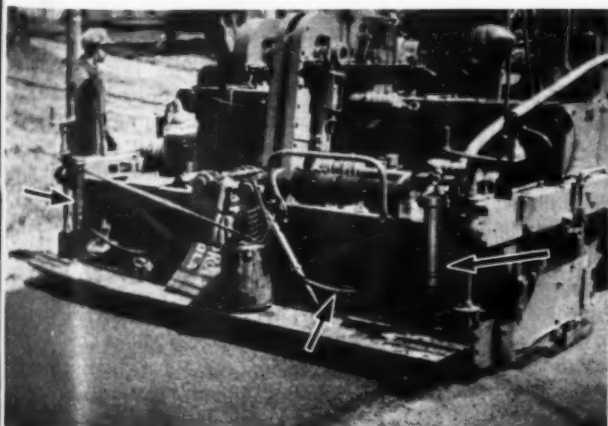
[The job described herein is part of an \$8,000,000 state-wide resurface program in Ohio which will involve 800 miles of the state system this year. An additional \$3,000,000 is being spent to surface-treat over two thousand miles.]

WARTIME travel restrictions have reduced the total traffic volume on most highways, but in Northeastern Ohio, in contrast, the war has intensified traffic on certain

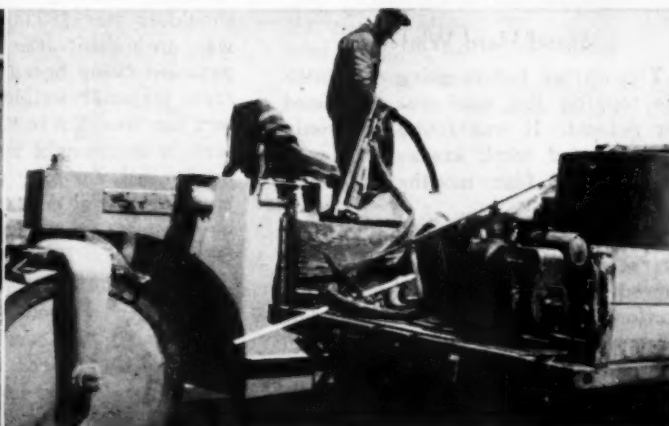
arterial routes. Heavy, fast trucking especially is increased since before Pearl Harbor, and some of our old pavements have gone to pieces rapidly during the recent severe winter and long, wet spring.

An example of the beating taken by our main routes is the damage to State Route 14. This diagonal route is on a straight "hi-ball" line between Cleveland and Pittsburgh, and also serves heavy traffic originating in

Akron, Youngstown and other surrounding industrial centers. A 7.3-mile section of this road, between Deerfield and Edinburg, cracked up so badly that last year it was docketed for resurfacing. The old 18-ft. pavement is of concrete, dating from about 1930, before as much was known about stabilization as is known today. It had developed an acute case of rocking joints, due to a combination of a poor clay subgrade, water entering the



Note leveling device, now required in Ohio. This unit is made up of two cylinders of water or hydraulic oil, connected with a tube. The specified 2-in. crown is kept "on the beam" by watching the height of small wires which rise and fall from floats in the cylinders



Time out for watering the rollers, done from a small tank truck with an air-cooled-motor pump

cracks, and overload from 20, 25 and 30-ton steel and coal trucks traveling at high speed. Because of war restrictions the normal procedure of widening to 20 or 24 ft. while resurfacing was omitted.

Resurfacing Details

The resurface, while involving no unusual departures from Ohio standard practice, is of interest in view of the growing importance of all types of salvaging and resurfacing work. To seal against moisture a 2-in. layer of hot-mix asphaltic concrete had been applied in 1941 and this effectively stopped or reduced pumping of joints over certain portions. This was indication of being on the right track, and the state department of highways decided to salvage and strengthen the road further before too late, and contracted the whole stretch for additional resurfacing late last year. The specifications called for a variable leveling or "wedge" course of hot-mix asphaltic concrete, followed by a 1-in. surface course.

A part of the material allotted for the leveling course was used in this instance to provide a thin $\frac{3}{4}$ -in. scratch coat of Type-A mix ($\frac{3}{4}$ -in. max. aggregate), which merely ironed out the corrugations and rough spots. Then the remainder of the material was applied to give a minimum combined thickness of 1-in., this thickness being increased where necessary to raise low places or to provide extra protection where joints were still rocking. All material was placed with a paver, which completed this part of the job last year just in time for winter. A 3-in. course of B-35 mix (same as other Type A levelling) was placed and rolled in two $1\frac{1}{2}$ -in. layers over specified sections, with transition back to the thinner sections in a distance of 30 ft. Special care was taken to develop a smooth riding quality before putting on the topping.

Stood Hard Winter

This spring before going over with the topping the road was examined for defects. It was found that only four isolated weak areas had developed during four months of heavy winter traffic.

The sealing value of the leveling course placed last year could be observed this spring by looking along sections of exposed pavement edge. Frequently water which had risen through cracks in the old pavement could be seen to seep out from under the leveling course, while the surface itself was perfectly dry.

The surface course, which was laid late in April, consisted of a so-called Type-B mix, with slag aggregate

100% passing $\frac{1}{2}$ -in. and 90-100% passing $\frac{3}{4}$ -in. opening. Slag was specified for the surface mix. Surface tolerance was $\frac{1}{4}$ in. in 10 ft.

The contractor used a mechanical spreader equipped with a home-made



Leveling cylinder float, shown lifted out for inspection, is made from a Carnation milk can, with gauging wire soldered on

leveling gauge in accordance with Ohio 1943 specifications (see accompanying photos), two 10-ton rollers, a heavy motor grader for shoulder work, water tank truck, light power broom, and light service truck. The estimated cost of the 7.3-mile job including building up traffic-bound shoulders was \$89,000. The contract was on a unit-price per cu.-yd. bid, payment being based on a conversion from material weights. The surface mix ran from 7.8 to 8.0% asphalt content, with the mix weighing 3550 lb. per cu. yd. for slag and 3800 lb. for stone or gravel mix. Asphalt was the usual 85-100 pen., applied at 300-350 deg. F. (275-375 specified limits).

Truck bodies for hauling hot-mix were insulated with ordinary pine boards, as a war compromise with the usual metal-covered insulation board covering sides and bottoms.

Acknowledgments

Ohio Road Improvement Co., of Columbus, was the contractor, with H. B. Fenton, general superintendent

and Lyle Mitchell in charge of the job. W. M. Wardman, assistant division engineer in charge of construction directed the job, which is one of several current resurfacing projects in the author's division area. Gordon Klohn was project engineer. H. G. Sours is Ohio Director of Highways.

C. H. Purcell Heads California Post-War Plan Group

California has just passed a new state reconstruction and re-employment act, which creates a nine man commission responsible for development of post-war construction planning.

Headed by Charles H. Purcell, director of public works, this commission is instructed to plan for and promote the improvement and expansion of the highway and freeway systems along with institutional and other state building work. Included in post-war construction authorizations totaling \$148,000,000, \$70,000,000 is for state highways, \$12,000,000 for highway plans and specifications, and \$1,500,000 is for county use in preparing plans and specifications for a \$20,000,000 county road program.

It is expected that the new commission will organize for an early start for purchase of rights-of-way and preparation of plans.

New Jersey Invests Road Funds in U. S. Bonds

As an additional war contribution, New Jersey will invest in United States obligations unexpended balances of county and municipal road maintenance and construction aid funds due on projects held up by material priorities.

Under the provisions of a statute enacted by this year's Legislature \$2,079,394, will be available for bond purchases. The law stipulates that the money as allotted to the various counties and municipalities be held to their credit until it can be applied to the purposes for which it was originally allocated.

C. E. Webb New Pres. W.S.E.

C. Earl Webb, western division engineer for American Bridge Co., is the new president of Western Society of Engineers, Chicago. Mr. Webb is a well known bridge engineer, the designer of many large highway and railroad structures including vertical lift spans. He is a graduate of Michigan State College.

Illinois Concrete Patching Program

Chicago Heights Coal Company job typical of thirty repair contracts on older concrete roads

CONTINUING an extensive concrete pavement patching program, which last year involved some five million dollars and several hundred miles of road, the Illinois Highway Department has let some 30 or more additional contracts, ranging from \$25,000 to \$200,000 each.

This program is worthy of close study both for the methods employed and for the fact that it is giving contractors a chance to prove their adaptability to pavement repair and salvage work. Practically all state road repair work in Illinois is awarded under the good old-fashioned institution of competitive unit-price bidding.

The repair sections are scattered throughout the state, involving for the most part 18-ft., 9-6-6-9-in. pavements built in the early 20's under the original \$60,000,000 and \$100,000,000 state bond issue programs. Some more recent pavements are included, however. Their need of repair being hastened by the increase in heavy trucking. A few bituminous roads also are involved.

Chicago Heights Coal Co. Contract

A typical contract is that of the above-named firm, which began the season by patching or recapping 11½ miles of Highway 50 southwest of Chicago. This 17-year-old 20-ft. road is a southern continuation of Chicago's arterial West-side Cicero Avenue, which serves the Municipal Airport and the huge Dodge Chicago war plant. Patches dating from several recent years give evidence of the beating this highway has been receiving from progressively heavier traffic.

The contract involves two types of work:

(1) Concrete patching bad spots varying in length from 2 ft. (the minimum) to a hundred feet or more along one or both lanes. The bid items included 668 sq. yd. (about 88 patches) removal and replacement of type II patches of 2 to 7 ft. average longitudinal length; 861 sq. yd. (66 patches) type III work, 7 to 15 ft.; and 4,383 sq. yd. (74 patches) type IV work, more than 15 ft.

(2) 800 cu. yd. high-early-strength rich-mix concrete resurface placed over the old pavement after breaking



Patching was expedited with a 27-E paver

it up and leaving the fragments as part of the compacted subgrade.

The contract price of \$52,764 also included 450 cu. yd. earth excavation and replacement of gravel or crushed stone sub-base, 1,000 cu. yd. borrow, 1,565 sq. yd. pavement breaking, 180 cu. yd. crushed stone; 1,335 sq. yd. pavement removal.

How Patching Was Done

To minimize detours and traffic inconvenience the job was divided into three work sections ending at arterial intersections. Each section was com-



A 2,000-lb. drop hammer was used to "soften" the old slab for removal

pleted and opened to traffic before closing the next. The section was barricaded to all but local traffic while stage operations progressed down one lane and back on the other.

Pavement Breaking. Slab areas to be removed were marked by the engineer with paint lines. The first step was for one or two men with pavement breakers to cut a plane of weakness along break lines where lines did not coincide with a joint or crack. Then edge reinforcing bars were exposed at edge corners and burned through with an acetylene torch.

Following this came a truck-mounted 2,000 lb. breaker which broke the slabs into hand size pieces for easy removal. (A ball breaker is not allowed in Illinois work because of vibration.) This work progressed a mile or more ahead of the concreting.

Pavement Removal. Small areas were removed with hand shovels, using two to six men. Where larger areas were excavated, labor was saved



Tom Peters of Chicago Heights Coal Company

with a small front-loader-equipped tractor, which proved an efficient and handy means of getting 100-lb. or heavier chunks into the dump trucks along with smaller material and unsatisfactory subgrade.

Base Preparation. The subgrade was excavated, cleared of debris and hand tamped to receive a uniform 10-in. patching slab. Where the patch was 50-ft. or more in length or the subgrade unsatisfactory, the subgrade was removed to 16 inches below top of pavement and backfilled with 6 inches (compacted) of crushed stone or gravel.

Details of Cuts. Using hand hammers a special effort was made to leave a trim nearly vertical pavement edge to insure a good joint. Illinois specifications permit 1½-in. max. deviation from vertical plane.

The cut for single-lane areas was extended beyond the center line far enough to make room for setting forms.

Most patch areas were made rectangular or nearly so, under specifications which require that interior angles of cut line at inside corner breaks be 45° or more, and angles elsewhere 60° or more. No less-than-lane-width interior cuts were involved, it being the experience in Illinois that plug patches on larger contract jobs are not economical.

Shoulder Drainage. Part of the work of the shovelers was to see that temporary outlets were trenched through shoulders where necessary to insure drainage of the area around the freshly placed patch.

Placing Concrete. Wood forms were used on shorter patches (10 ft. or less) and steel forms on longer. The concreting outfit consisted of a 27-E paver served by batch trucks from a nearby material yard. A hand vibrator was used along the forms.



Well prepared patch area with selected material including span from old pavement tamped in the subgrade

A heavy wood strike-off template was followed by wood float belt and broom. Surplus concrete left after striking off the patch was moved with a small cart. Curing was by means of two layers of impregnated canvas securely weighted down and kept in place 4 days (high-early cement used).

Expansion Joints. The pavement on this job was originally built with 4-in. filled expansion joints located every 1,000 ft. and at tops and bottoms of hills. Over the years these joints had squeezed to about 2 inches. Where patch areas extended on one or both sides of an expansion joint the joint was recreated by inserting a removable wooden filler plate (see photo, page 44), consisting of two ½-in. boards with 1-in. separators. On single-lane patches the joint was accurately located as a continuation of the existing joint in the other lane.

Patching Mixture. High-early-strength cement was used under option which also permitted a rich-mixture normal portland cement concrete. Well graded 2-in.-max. stone was used.

Recapping Sections. About 1,200



Concrete was vibrated along the forms



Burning edge bars

lin. ft. of the old pavement in three places was entirely recapped by an overlap of 10-in. uniform plain concrete with necessary short transition to the raised grade line. Transition to new grade was made at rate of 1 in. per 100 ft. The old pavement was not removed but was broken up into pieces about one foot square and the broken area leveled and compacted with a 3-ton truck roller. A 2-in.



Front lift makes short work of old pavement removal from more extensive areas



The small surplus of concrete dumped for each patch was moved by wheel cart to the next patch



Concrete was cured 4 days under two layers of impregnated canvas. Note shoulder ditches provided in event of overnight rain

gravel cushion was placed, rolled and given moisture application before paving over.

Patching Costs in Illinois. Costs of pavement patching naturally vary greatly depending on many factors. Contract prices this year in Illinois have run usually from \$6.50 to \$7.50 per sq. yd. including all labor and materials for breaking up old pavement, disposing of waste, repairing and restoring shoulders.

Tom Peters of Chicago Heights Coal Co. managed this job, with W. B. Turley resident inspector. It is one of several patching projects in the Chicago district under state district engineer C. H. Apple. The statewide program is in charge of C. M. Hathaway, engineer of construction. W. W. Polk is chief highway engineer.



What a furlough! John Lobue, who with his brother Sam of Lobue Ice and Coal Co., operated their "front-lift" unit on the Chicago Heights Coal Co. contract. John put in a 10-day furlough to help, with the OK of his senior officer, as his bit toward helping the labor shortage

Thumb-Nail Summary of Concrete Pavement Patching Practice

A COMPLETE review of this subject is contained in the report (1942) of the Highway Research Board Subcommittee on Salvaging Old Pavements, Rigid type. Highlights of this report are included in the following.

Design of Patch

Patch areas should preferably be marked off by an experienced maintenance engineer after a careful survey.

Remember, serviceability of a patch depends much on its shape and position with respect to edges and joints.

Make patch at least 4 ft. long (longitudinal) where the area is some distance from a transverse joint, or on one side of a contraction joint.

Extend patch at least 6 ft. on both sides if extending through an expansion or butt construction joint.

Transverse joint running through a full-width patch area can usually be relocated along one edge of the patch.

In half-width patching expansion joints in undisturbed lane should extend through new concrete.

For less-than-lane-width patches, 4 to 6 ft. is the range of best transverse dimension.

Rectangular plug patches for interior breaks on both sides of a center joint, are best extended from 4 to 6 ft. on either side. Diamond-shaped plugs, built one side at a time, should also extend 4 to 6 ft. laterally on either side of the center joint. Diamond shaped plugs use least concrete.

Thickness

Where pavement in general isn't being overloaded and subgrade is made satisfactory, following thicknesses are acceptable for small patches.

Center thicknesses of old slab times 1.3 at unprotected corners

and times 1.2 at protected corners for thickened-edge pavement.

Slab depth times 1.1 at unprotected corners and times 1.0 elsewhere when repairing uniform-thickness pavement with load-transfer expansion joints.

Same depth if involving uniform-depth slab without load-transfer.

For extensive patches of 50 ft. or more make uniform thickness, using 1.2 depth factor for thickened-edge and same depth for uniform-thickness pavement, with thickening at transverse expansion joints.

Preparing Patch Area

On small isolated jobs, where concrete is broken into man-size chunks with hand rock mauls, breaking up is expedited by raising slabs with spikes or crow bars.

Where pneumatic breakers are used, patch area is first cut around preferably with chisel bits with 2 to 3-in. face, making three or four passes to cut down an inch or so to insure a clean break.

To complete the break, first cut a hole clear through using a moil point bit, then enlarge hole with moil point and chisel bits and cut into 50-100 lb. pieces. Helpers should remove all fragments promptly to keep a clear front for the breakers.

Truck mounted units with air and trip-hammer operated breaker hammers are recommended for breaking operations on large patching jobs.

In cutting patch edge, avoid fins that will later cause spalling.

Before placing concrete, see that slab edges are sprinkled to remove dirt particles, but not too wet to bond with the new concrete.

Undercutting the old slab edges is not recommended on the score of expense, difficulty of exposing bottom of



Temporary wooden separator used at expansion joints. Note how new joint matches old joint in right photo



old slab, and difficulty of compacting new concrete.

Be sure subgrade is of quality you would expect for a new pavement before placing patch.

Placing Concrete

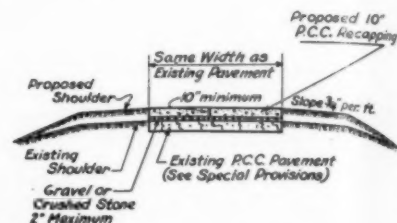
To insure minimum shrinkage, use concrete as dry as can be properly

placed, compacted and finished. Slump: $1\frac{1}{2}$ inches max.

Design concrete for high early strength—500 p.s.i. modulus of rupture at time of opening to traffic by using either low w/c ratio (4 gal. mix) at high-early-strength cement, or both, or by adding not more than 2 per cent calcium chloride by weight

of cement. Accurate weight-proportioning of mix is recommended.

Since some shrinkage in concrete occurs while hardening, the first

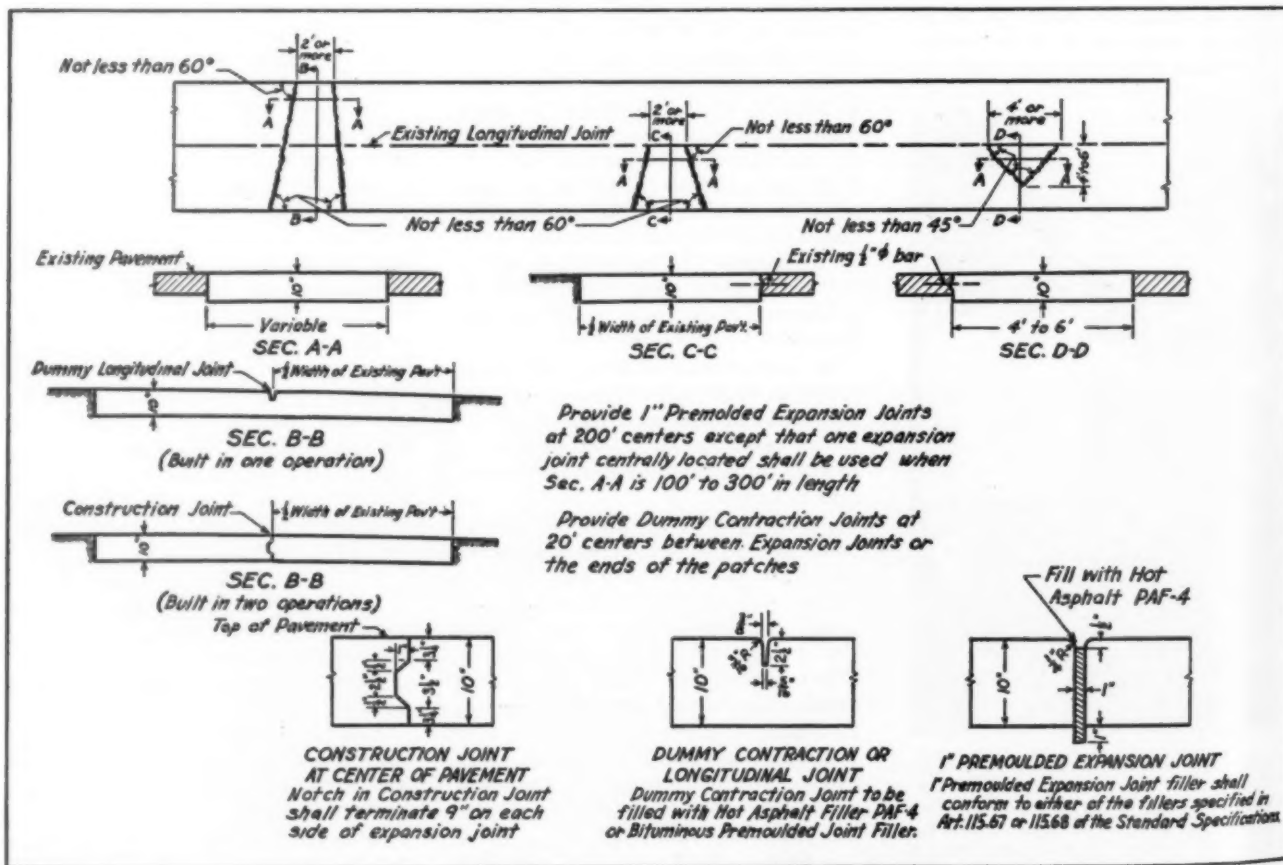


Illinois typical cross-section for recapping old concrete pavement with new

strike-off and tamping should leave the concrete slightly above the finished level. Later, after longest interval when good finishing is still possible, re-screed and tamp vigorously.

Prescott G. Brown Named to Wayne County Commission

Prescott G. Brown, head of the Mason L. Brown consulting engineering firm of Detroit, was appointed by the Wayne County Board of Supervisors to succeed the late John F. Breining as a member of the Wayne County Road Commission. The term will expire in three and a half years.



Standard Illinois 10-in. patching details for concrete pavement

Effect of Calcium Chloride Admixture on strength of concrete cured at low temperatures

By H. W. RUSSELL

Engineer of Materials, Illinois Division of Highways, Springfield

(The following article represents a somewhat condensed version of Mr. Russell's original report, which is available on request to Illinois Division of Highways.)

1. Introduction

IN concrete pavement maintenance, repairs by patching with concrete have been found expedient where breaks are detrimental to traffic. Since patches must be opened after the shortest possible curing period, special precautions are required to insure early concrete strength in weather too cool for normally satisfactory strength gains.

The general precautions are to pre-heat the concrete ingredients, use a rich mix of standard portland cement, use high-early-strength cement, or add calcium chloride to accelerate strength gain. Though these steps

are widely applied, there is much uncertainty as to the most economical method for given conditions. Obviously precautions needed at 32° F. would not necessarily be required at say 60° F.

Some field data relative to the use of calcium chloride in various mixtures were submitted, with a short report pointing out the need for an investigation that would lead to more economical methods of patching. Conclusive data, it was observed, could not be obtained under the uncontrolled conditions of actual field repair work. Specifically an investigation was desirable for these reasons:

(a) Concrete patching hampers

traffic flow and presents a hazard as long as barricades remain in place.

(b) Maintenance costs for barricades, with signs, flares, watchmen, etc., increase with the barricade period.

(c) The number of barricades needed per repair outfit, amount of equipment, and cost of handling, increase with the length of barricading period.

(d) Shortening the curing time serves to lengthen the working week for repair crews, since Illinois state highway department policy is to remove all barricades by Saturday noon for week-end traffic. For example, a 72-hr. mixture would have to be placed by Wednesday noon; a 48-hr. mixture

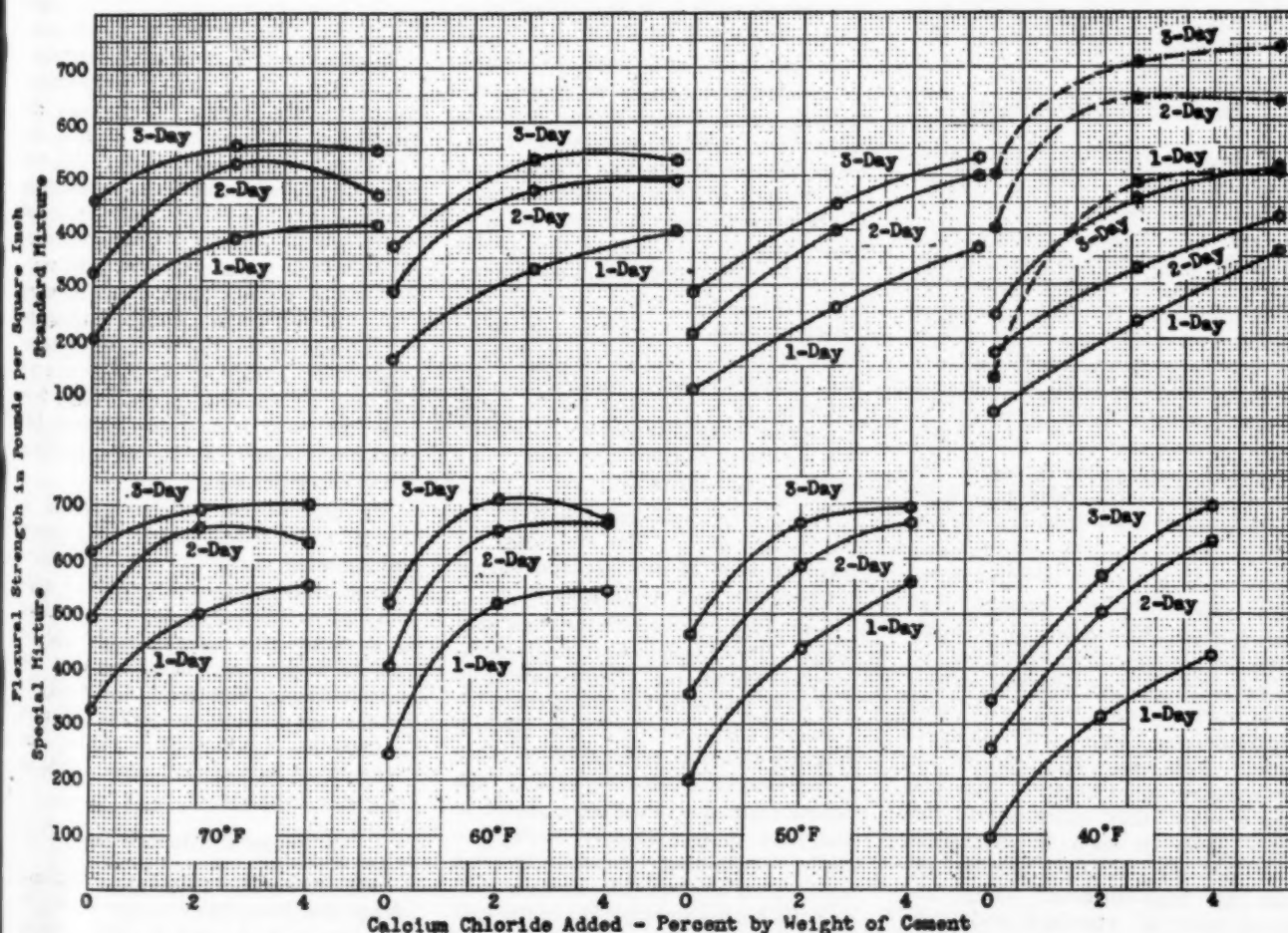


Fig. 1—Effect of addition of calcium chloride upon the 1, 2 and 3-day flexural strength of concrete cured at various temperatures. (Full line curves represent standard cement; broken line curves represent high-early-strength cement)

as late as Thursday noon, adding a day to the working week and thus reducing overhead and idle equipment time.

A search of engineering literature has revealed practically no information directly applicable. In most of the data published, the curing temperatures were room temperature or below-freezing temperatures. The test ages usually were 7 days or greater and therefore inapplicable to conditions where the strength of the concrete during the first three days is the main issue. However, there seemed to be rather definite agreement that the optimum amount of calcium chloride for cold weather construction is from 2 to 4% by weight of cement, and that 2% is about as effective as any greater amount.

One problem to be solved was that of creating controlled conditions for curing the concrete in such an investigation. It was found that with the aid of a special thermostat, the cold room ordinarily used for freezing and thawing tests could be used, making possible an investigation under closely controlled conditions of mixtures for use in maintenance patching of concrete pavements.

This investigation was started in February, 1942, and is now completed. The data obtained are presented and analyzed herein.

2. Scope of the Investigation

In order to keep the investigation within reasonable limits it was assumed that ingredients for cold-weather mixtures, to obtain early strength, would have to be preheated to the degree necessary for a mixture of at least 70° F. This permitted storing test ingredients and mixing at room temperature, which was kept fairly uniformly near 70° F. (Actually within 6° of a 73° F. average). If a field mixture should be placed at a somewhat higher temperature, the results should be somewhat better than those obtained from the tests.

The mixture regularly used in pavement construction was included in the tests because it was thought that, with calcium chloride added, it would often be satisfactory when the air temperature is not extremely low. This mixture was used with both standard and high-early-strength cement. The latter was used only in the mixture cured at 40° F., since it was thought that calcium chloride would never be used in connection with high-early-strength cement, except at near-freezing. Only one brand each of standard and high-early-strength cement was included.

Special mixtures designed to pro-

duce concrete for opening to traffic in 3 days under ordinary field curing temperatures, using standard portland cement, were included because it was believed that these would ordinarily be used during near-freezing, unless high-early-strength cement were available. The design of these mixtures was developed partly from mortar-voids test data and partly from field strength data. Since curing temperatures during the normal construction season usually are higher than 70° F., this design will generally fall short of producing the required strength in 3 days when the mixtures are tested under controlled laboratory conditions. The design, however, is believed to represent mixtures having a maximum practicable cement content, or about 1.8 bbl. per cu. yd. of concrete.

3. Materials, Mixtures and Procedure

The aggregates used were sand and crushed stone from laboratory stock. Proportions were as follows:

	Regular	Special
Cement (lb.)	94	94
Sand (lb.)	212	140
Stone (lb.)	337	259
Water (gal.)	5.7	4.6
Yield (cu. ft.)	4.57	3.51

These proportions, without the addition of calcium chloride, were expected to result in mixtures having a slump between 3 and 4 in.

It was intended to study the effect of calcium chloride in mixtures containing 0, 2, 4, and 6% of calcium chloride by weight of cement. However, the use of 6% was discontinued due to impossibility of making satisfactory specimens. Amounts of 0, 2, and 4% were used only in the special mixtures. When the regular mixtures were made, the same amounts per batch as used in the special mixtures were inadvertently added in the regular mixtures, resulting in the percentages of 0, 2.6, and 5.2 in these mixtures. This discrepancy, however, did not detrimentally affect the value of the data obtained.

The curing temperatures were 70, 60, 50, and 40° F. The procedure for any one type of mixture and curing temperature was as follows:

Each batch provided nine 6"x6"x30" beams. Two batches were made without calcium chloride. The beams from one were placed in the moist room for standard curing at 70° F. and under a relative humidity of from 95 to 100% to provide data for comparison. The beams from the other were placed in the cold room. Batches were then made, containing respectively the amounts of calcium chloride as stated, and the beams were placed in the cold room.

Three beams from each batch were

removed from the forms and tested at each of 24, 48, and 72 hr. The beam pieces remaining from the 24 and 48-hr. tests were returned to the cold room, or to the moist room when cured under standard condition. After the 72-hr. test, all beam pieces from the cold room were placed in the moist room for further curing and for removal for testing as modified cubes at the ages of 7, 14, 28, 90, and 365 days, in an effort to determine if there was any ultimate detrimental effect from the use of calcium chloride or from the curing at low temperatures.

The curing obtained in the cold room was evidently very efficient from the standpoint of moisture retained in the specimens. The relative humidity on the average was more than 80% shortly after the beams were placed in the cold room and increased to about 90% at 24 hr. curing. Based on a few readings taken subsequently, the relative humidity evidently remained at 90% to the end of the 72-hr. period required for each series. The cold room was controlled within 1 or 2° F.

4. Effect of Calcium Chloride On Consistency of Concrete

Addition of the smaller percentages of calcium chloride in all instances increased the slump of the mixtures, while addition of the larger percentages on the average decreased the slump. For the special mixtures, the average slumps obtained were 3.7, 4.9, and 2.3 in., corresponding respectively to additions of calcium chloride of 0, 2, and 4%. Similarly, for the regular mixture containing standard cement, the average slumps obtained were 3.6, 4.8, and 2.8 in., corresponding to 0, 2.6, and 5.2%. The mixture containing high-early-strength cement showed the same trend, although few batches were mixed, the slumps being 2.6, 4.0, and 3.0 in., corresponding to 0, 2.6, and 5.2%.

In general, the batches seemed to have about the same consistency while being mixed but the high-chloride mixtures appeared to stiffen rapidly after discharge from the mixer and before the slump test could be made. It is seen, therefore, that the conditions of placement, especially if operations are apt to be delayed, may constitute a limitation upon the amount of calcium chloride usable in a given instance.

5. Flexural Strength Data

Flexural strength data resulting from the investigation are shown in Tables 1, 2, 3, and 4. Since three beams were tested in each instance

Table 1—Flexural strengths of moist room cured specimens (PSI). No. calcium chloride added

Age in Days	Standard Cement—Standard Mixture				Av.	Standard Cement—Special Mixture				Av.	H. E. S. Cement Std. Mixture
	1	2	3	4		1	2	3	4		
1.....	195	190	190	196	193	309	287	283	280	290	469
2.....	328	325	296	333	321	441	446	466	460	453	656
3.....	439	422	390	465	429	584	561	570	576	573	716

Note: The numbers 1, 2, 3, and 4 in the column headings signify that the batches represented were made at the same time as batches cured at 70, 60, 50, and 40° F., respectively, and are directly comparable with batches so indicated in Tables 2 and 3.

Table 2—Effect of curing temperature (°F.) and addition of calcium chloride (%) on flexural strength (PSI). Standard cement—standard mixture

Age in Days	70° F.			60° F.			50° F.			40° F.		
	0%	2.6%	5.2%	0%	2.6%	5.2%	0%	2.6%	5.2%	0%	2.6%	5.2%
1....	205	382	410	165	330	399	108	259	369	65	230	359
2....	323	526	469	290	473	496	205	398	498	175	330	422
3....	457	558	548	372	531	529	289	448	531	242	459	517

Table 3—Effect of curing temperature (°F.) and addition of calcium chloride (%) on flexural strength (PSI). Standard cement—special mixture

Age in Days	70° F.			60° F.			50° F.			40° F.		
	0%	2%	4%	0%	2%	4%	0%	2%	4%	0%	2%	4%
1....	326	501	553	248	520	540	198	436	559	92	312	421
2....	494	658	629	407	651	666	354	587	668	255	502	630
3....	612	692	700	521	708	672	463	664	692	347	569	695

Table 4—Effect of addition of calcium chloride (%) on flexural strength (PSI) at 40° F. curing temperature. High-early-strength cement—standard mixture

Age in Days	40° F.		
	0%	2.6%	5.2%
1.....	129	487	506
2.....	403	641	636
3.....	501	708	734

and two breaks were made on each beam, each of the tests results, except those in the "average" columns in Table 1, represents six tests. This number of tests has generally been considered sufficiently large under controlled conditions to yield data on which fairly definite conclusions may be based.

Standard Curing. Strengths of moist-cured specimens are compiled in Table 1. The data were so uniform that it was decided to use the average results for each type of mixture as a basis for comparison.

In general only the mixture containing high-early-strength cement developed 650 lb. per sq. in. or better within the test period. This strength, considered necessary for opening to traffic, was on the average obtained in about 2 days. The special mixture containing standard cement, as was expected, fell somewhat short of this strength at 3 days, the average being 573 lb. The standard mixture in which standard cement was used averaged only 429 lb. in 3 days.

Cold Room Curing. Tables 2 and 3, respectively, show the strengths under cold-room curing with standard cement in standard and special mixtures, with various amounts of cal-

cium chloride and under various temperatures.

From Table 2 it appears impossible to obtain an average strength of 650 lb. within 3 days with the standard mixture at any of the curing temperatures and with either of the percentages of calcium chloride added. Four, five or more days would have been required.

With the special mixture, on the other hand, see Table 3, it is possible at any of the curing temperatures to incorporate an amount of calcium chloride which will give reasonable assurance that the required strength will be obtained in either 2 or 3 days. Thus at 70 and 60° F. curing, 2% chloride incorporated produced this strength at 2 days; at 50° F. the required strength was obtained in 3 days by using 2%; in 2 days by using 4%. At 40° F. curing, the required

strength was not obtained with 2% calcium chloride, but when 4% was used it was approached in 2 days and definitely obtained in 3 days.

The data in Tables 2 and 3 show practically the same trend. It appears that there is no advantage in the larger percentage at 70 and 60° F. curing, in preference to the smaller percentage. While the larger percentage may show better results at 1 day, it may show inferior results at 2 or 3 days. At 50 and 40° F. curing, especially the latter, the larger percentage of calcium chloride shows far the best result at all test ages.

Table 4 shows the results of high-early-strength cement in the standard mixture at 40° F. curing. Required strength is approached closely at 2 days and exceeded at 3 days for both percentages of calcium chloride. The results, however, differ from those obtained with standard cement in that there seems to be little advantage in the use of the larger percentage of calcium chloride at 40° F. curing. From analogy with the results in Tables 2 and 3, this undoubtedly would be the case also at other curing temperatures.

Figure 1 (see page 45) is a graph of the data in Tables 1, 2, and 3. Although each curve is defined by only three points, the graph nevertheless should be of value in determining a satisfactory percentage of calcium chloride for use under any given curing temperature.

It is to be regretted that the investigation could not be extended to include a mixture intermediate to the standard and special mixtures containing standard cement, which undoubtedly would be satisfactory in many instances when the temperature is not too low, especially when the required strength need not be obtained before the age of 3 days. The amount of cement required in such

Table 5—Modified cube strength of moist room cured specimens represented by table 1 (PSI). No calcium chloride added

Age in Days	Standard Cement—Standard Mixture				Av.	Standard Cement—Special Mixture				Av.	H. E. S. Cement Std. Mixture
	1	2	3	4		1	2	3	4		
7.....	3982	3997	3676	4075	3933	5321	5598	5823	5932	5669	6304
14.....	4845	5024	5251	5755	5219	6906	7145	7565	7038	7176	7499
28.....	5661	5678	6135	6789	6066	7390	7972	7724	7634	7680	7646
90.....	6902	6808	7431	7748	7222	8403	8980	9589	9509	9120	8737
365.....	7692	7882	7311	8495	7845	9566	9590	9831	10152	9782	9448

Table 6—Modified cube strength of specimens represented by Table 2 (PSI), showing effects of curing temperature (°F.) and addition of calcium chloride (%). Standard cement—standard mixture

Age in Days	70° F.			60° F.			50° F.			40° F.		
	0%	2.6%	5.2%	0%	2.6%	5.2%	0%	2.6%	5.2%	0%	2.6%	5.2%
7....	4101	4749	4610	3697	4764	4673	3536	4632	4595	3761	5270	4780
14....	5079	5174	5167	4979	5174	4979	5274	5410	5299	5890	6265	5673
28....	5849	6059	5815	5698	5822	5704	6462	6366	6198	6908	6927	6247
90....	7091	7261	7220	6827	7180	6799	7317	7369	7232	7766	7723	7011
365....	7865	7813	7523	7897	8236	7614	7869	8007	7464	8412	8723	7703

Table 7—Modified cube strength of specimens represented by Table 3 (PSI), showing effects of curing temperature (°F.) and addition of calcium chloride (%). Standard cement—special mixture

Age in Days	70° F.			60° F.			50° F.			40° F.		
	0%	2%	4%	0%	2%	4%	0%	2%	4%	0%	2%	4%
7....	5827	6131	6050	5223	6200	6026	5643	6821	6699	5485	6467	6274
14....	6737	7157	6623	6898	7147	7037	7126	7863	7051	6937	7115	7216
28....	7571	7415	7694	7891	7892	7586	7937	7990	7454	7503	7736	7699
90....	8536	8829	8663	8880	8982	8960	9410	9562	8970	9227	9257	8962
365....	9261	9235	8740	9465	9553	9415	9889	9924	9047	9718	9704	9440

Table 8—Modified cube strength of specimens represented by Table 4 (PSI), showing effect of addition of calcium chloride (%) at 40° F. curing temperature. High-early-strength cement—standard mixture

Age in Days	40° F.		
	0%	2.6%	5.2%
7.....	6334	7090	6139
14.....	7608	7855	6801
28.....	8055	8107	6934
90.....	8942	9157	8151
365.....	9806	9803	8599

mixture may undoubtedly be estimated with some degree of accuracy from the data in Tables 2 and 3 or from Figure 1.

6. Modified Cube Strength

Compressive strength data resulting from the testing of the beam pieces remaining from the flexural tests as modified cubes are shown in Tables 5, 6, 7 and 8, these data being arranged to correspond respectively to the flexural strength data shown in Tables 1, 2, 3, and 4. Of the 27 beam pieces remaining from the 9 beams in each batch, 5 each were tested at 7, 14 and 28 days, 6 each at 90 days and one year.

Table 1 shows that there was excellent gain in strength of the concrete cured in the moist room. Comparing these data with the results in Tables 6, 7, and 8 for batches containing no calcium chloride, it is seen that the lower curing temperatures during the first 3 days of curing had no ultimate detrimental effect. However, in Tables 7, and 8, there is a slight indication of beneficial effect from such preliminary curing at 50 and 40°F.

Tables 6, 7, and 8 show considerable evidence of increased strength at 7 days, due to calcium chloride and slight evidence of this at 14 days. However, at 28, 90, and 365 days, the calcium chloride evidently had ceased to be a factor in producing increased strength, and there is some evidence, as will be explained, that it may be detrimental under certain conditions.

The smaller percentage of calcium chloride (2% in special mixture and 2.6% in standard), apparently had no detrimental effect in any mixture. The 4% calcium chloride in the special mixtures especially for 50 and 40°F. curing (Table 7), shows some reduction in the 90 and 365-day strengths,

as compared with the mixtures without calcium chloride, but this could be due merely to the natural fluctuations in test results. On the other hand, the 5.2% standard mixtures (Tables 6 and 8) show reductions in strength of about 10% for 40°F. curing at 28, 90 and 365 days for the standard cement and at 14, 28, 90 and 365 days for the high-early-strength cement; also smaller reductions at 14 and 7-day ages for the two cements, respectively. The use of as much as 5.2% of calcium chloride when the curing temperature is as low as 40°F. is conclusively detrimental to normal gain in strength at later ages although it may be very beneficial at early ages. At all other curing temperatures (Table 6), use of 5.2% calcium chloride did not show conclusive detrimental effect. It is believed, however, that the use of calcium chloride in percentages as high as 5.2 should generally be avoided.

7. Applicability of Data

It is believed that the test data presented are of general applicability to cold weather patching of concrete pavement, if the limitations of the investigation are considered. Cements of other brands might have produced higher or lower strength levels; gravel instead of stone aggregate, likewise. Neither of these changes, however, would be expected to have any effect on the general characteristics of the data. On the other hand, a significantly lower initial mixture temperature probably would have had a very marked influence on the data.

8. Conclusions

The following conclusions are believed to be warranted on the basis of the data and discussion presented:

(a) Addition of the smaller percentages of calcium chloride (2.0 and 2.6) increased the slump of the mixtures, whereas the larger percentages (4.0 and 5.2) decreased the slump, this decrease apparently being due to a stiffening immediately after mixing. When 6% was used, the mixture stiffened so much that it was impossible to make satisfactory specimens.

(b) Curing in the cold room was fully as efficient as in the moist room, as evidenced by comparisons at 70°F.

(c) Sufficient strength for opening

to traffic within 3 days, under curing up to 70°F., was not obtained with the standard mixture (cement factor average 1.4) when standard cement was used, with either of the percentages of calcium chloride added.

(d) With a special mixture averaging about 1.8 bbl. standard cement per cu. yd. of concrete (amount depending on aggregates) it is possible to incorporate calcium chloride, ranging from about 2% for curing near 70°F. to about 4.0% for curing near 40° F., which will insure sufficient strength for opening to traffic within 3 days, at any curing temperature down to 40° F.

(e) When high-early-strength cement is used in a standard mixture (cement factor average 1.4), sufficient strength for opening to traffic within 3 days may be obtained at 40° F. curing with a small addition of calcium chloride, 2.6% being used in the tests.

(f) No material advantage seemed to result from the larger percentages of calcium chloride (4.0 and 5.2) at curing temperatures as high as 60 and 70° F., whereas the larger percentages may be necessary at lower temperatures to insure the desired results. Exceptions: no apparent advantage where high-early-strength cement was used; and probably some disadvantage with the higher percentage (5.2) at 40° F. curing.

(g) Mixtures containing somewhat less cement than used in the special mixture may be entirely satisfactory at curing temperatures of 60 and 70° F., especially if the full 3 days may be used in obtaining sufficient strength. It should be possible to estimate with a fair degree of accuracy the amount of cement required in such mixture by interpolation between the data obtained for the regular and special mixtures.

(h) From the results of modified cube tests of the beam pieces left from the flexural tests, it was found that the use of a percentage of calcium chloride as high as 5.2 is detrimental to normal gain in strength when the concrete has been cured initially for three days at 40°F. It appears that the use of percentages of calcium chloride greater than 4.0 should be avoided.

(i) It is believed that, despite the limitations of the investigation, the data presented are capable of general application in the field if the degree of deviation of the field conditions from those present in the tests and the effect of such deviation are judiciously considered. The initial temperature of the mixture in any given case should not be lower than that used in the tests.

Madison Has Long-Range Plan

A six-year improvement program designed to fill normal civic needs

By T. F. HARRINGTON

City Engineer and Secretary,
Post War Planning Committee,
Madison, Wisconsin

LIKE other American cities, Madison has always had a long list of improvements waiting their turn as desirable and necessary to its continued growth. Our entry into the war brought curtailment at a time when several miles of streets were programmed for eventual replacement, and other ambitious civic enterprises were being actively considered. Rather than stop dead in our tracks for the duration, so to speak, it was seen that wartime could be turned into a time of great progress, depending on our ability to plan and coordinate our future needs.

On April 21, 1942, Mayor James R. Law proposed the appointment of a committee to set up a post-war program, and this committee held its first meeting June 22 of last year. A Long

Range Program, as we prefer to call it, because it deals with normal continuing needs, was submitted to the city Council on November 10. This program was designed for utmost flexibility, dependent on the amount of improvement work that would be permitted in 1943 and succeeding war years. Its greatest advantage is that it has considered each project in relation to the city's needs as a whole. It sets up a six-year program based on careful estimates of the city's ability to finance the work with no change from the present tax rate.

In order to build the plan on a sound financial basis, a study was made of the more important factors that would influence the city's revenues. These studies included the factors of population, assessed valuation,

types of property taxes, distribution of property taxes, relief needs, WPA employment in the county, long-term liabilities, and general city liability, including debt service.

Population, which has risen from 57,899 in 1930 to 66,447 in 1940 and 68,500 (estimated) in 1942, was foreseen to reach 75,000 in 1948 without any suburban annexation.

The report conservatively anticipates that total tax valuation and levies would remain about level, these items for 1942 being estimated respectively at \$136,000,000 and \$3,600,000. Long term liability included retirement of present bonds and issuance of \$450,000 new bonds annually for six years. Total annual revenues would be at about the present 2½ million dollar level, or slightly under-

STREET PROJECTS IN MADISON'S LONG RANGE PROGRAM

Prospectus Number	DESCRIPTION	Status of Plans (*)	Total Cost (Including Land if Necessary) (Dollars)	PROPOSED EXPENDITURES BY YEARS					
				1943	1944	1945	1946	1947	1948 Reserve
40	Widen S. Park St.; Vilas to Ridgeway.....	6	152,000	152,000	.....	.....	.....	.....	.....
41	Grade Separation W. Washington & R.R. (a).....	5	543,661	.....	.....	.....	.....	.....	543,661
43	Widen E. Washington; North St. to City Limits (b).....	4	170,000	.....	.....	.....	84,990	85,010	.....
44	Repave E. Washington; Pinckney to Winnebago.....	1	390,000	.....	.....	.....	290,000	100,000	.....
45	Widen Regent St.; Park to Washington.....	2	54,000	.....	.....	(x) 3,660	50,340	.....	.....
46	Widen W. Washington; Proudft to Park.....	6	97,000	.....	.....	.....	26,735	70,265	.....
53	Repave Bassett; Johnson to R.R. (e).....	1	22,000	.....	.....	.....	.....	.....	22,000
54	Repave University Ave.; Francis to Park; Charter to Breese Tr.	1	72,000	72,000	.....	.....	.....	.....	.....
55	Repave University Ave.; Breese Tr. to Allen.....	1	40,000	40,000	.....	.....	.....	.....	.....
56	Repave E. Wilson; King to Blair.....	1	30,000	.....	.....	.....	30,000	.....	.....
57	Repave W. Johnson; Randall to Bassett (e).....	1	57,000	.....	.....	.....	.....	.....	57,000
58	Repave Johnson; Bassett to Hamilton (f).....	1	47,000	.....	.....	.....	.....	.....	47,000
59	Repave Johnson; Hamilton to Blount.....	8	45,000	.....	.....	.....	.....	.....	45,000
60	Repave Johnson; First to North.....	1	100,000	.....	.....	.....	.....	.....	100,000
61	Repave Wisconsin; Mifflin to Langdon.....	5	20,000	.....	.....	.....	.....	.....	20,000
62	Repave Williamson; Blair to Langdon.....	5	125,000	.....	.....	.....	30,350	94,650	.....
63	Repave W. Washington; Carroll to Bedford (g).....	1	64,000	.....	.....	.....	.....	.....	64,000
64	Pave Ridgeway Ave.; S. Shore Dr. to Mills St. (c).....	1	15,000	.....	.....	.....	.....	15,000	.....
65	Construct Bridge on Lakeside at Wingra Creek.....	1	20,000	.....	.....	.....	.....	.....	20,000
66	Construct Bridge on Fitchburg at Wingra Creek.....	1	20,000	.....	.....	.....	.....	.....	20,000
67	Repave E. Main; Webster to Ingersoll.....	1	74,000	.....	.....	.....	.....	.....	74,000
68	Revise Map of City and Environs.....	1	3,000	.....	.....	.....	.....	.....	3,000
69	Repave on Webster, Doty, Fairchild and Dayton.....	1	90,000	.....	.....	.....	90,000	.....	.....
70	Repave W. Mifflin; Fairchild to Bedford (e).....	1	31,000	.....	.....	.....	.....	.....	31,000
71	Repave N. Livingston; Washington to Johnson.....	1	15,000	.....	.....	.....	.....	.....	15,000
72	Repave Blair; Johnson to Railroad.....	1	25,000	.....	.....	.....	.....	25,000	.....
73	Repave Broom; State to R.R. (e).....	6	28,000	.....	.....	.....	.....	.....	28,000
102	Cross Town Connection on Fourth St.....	1	500,000	.....	.....	.....	.....	.....	500,000
103	Street Lighting on University; Park to Breese Tr. (d).....	1	30,000	.....	.....	.....	.....	.....	30,000
104	Street Lighting on E. Washington; Webster to Yahara R. (d).....	1	85,000	.....	.....	.....	.....	.....	85,000
105	Street Lighting on W. Washington; Fairchild to R.R. (d).....	1	30,000	.....	.....	.....	.....	.....	30,000
106	Street Lighting on Regent; Washington to Monroe (d).....	1	33,000	.....	.....	.....	.....	.....	33,000
107	Box Culvert Manitou Way; Tumalo to Nakoma Golf.....	2	9,200	.....	.....	.....	.....	.....	9,200
TOTAL STREETS			3,039,861	264,000	.....	3,660	367,075	405,605	219,660 1,779,861

(*) Status of Plans designated by the following numbers:
1. Preliminary Estimate.
2. Survey Begun.
3. Survey Completed.
4. Sketches in Preparation.
5. Sketches Completed.
6. Detailed Plans in Preparation.
7. Detailed Plans Completed.
8. Specifications Completed.

(a) State Highway Commission to Contribute \$250,000 & R.R. Co. \$95,661.
(b) Estimated that \$46,800 would be contributed by State Highway Commission.
(c) One-half Cost to be Defrayed by Special Assessment.
(d) Two-third Cost to be Defrayed by Special Assessment.
(e) Special Assessment 40% of Total Cost.
(f) Special Assessment 40% of Total Cost of One Block.
(g) Special Assessment 40% of Total Cost of Two Blocks.
(x) Preconstruction Costs.

The analysis and plan as presented includes a detailed breakdown of all probable sums and sources of revenue, as well as detailed list of projects and specific methods of financing each. The program covers streets, sewers, and miscellaneous engineering works, park department, building department, and general city expenditures; also improvements that would come under other boards or corporations, such as schools, water, sewerage district, library, etc.

33 Street Projects

Under street work is listed a total of thirty-three improvement projects, ranging from \$9,200 to \$543,000 and totaling \$3,000,000. The first-year projects include one to cost \$152,000 and two lesser ones, for which detailed plans are now in preparation. Report on the status of each project—whether merely preliminary estimate, or survey begun, survey completed, sketches in preparation, sketches completed, detailed plans under way, or plans done—is an important part of the presentation.

The entire program was attractively yet economically submitted as a mimeographed, bound document which has been widely publicized. The favorable effect it has had on the citizens is due we believe to the conservative program advanced, the holding down of taxes, and the clear statement of where all moneys are coming from and where they are going. Much credit is due the members of the Post War Planning Committee, which includes F. Halsey Kraege (city finance committee), chairman; Frank Karstens (board of public works); M. W. Torkleson (state planning board); and Roger Kirchoff (state architect). When the war is over Madison expects to be ready with blue-prints.

OPA Dump Truck Rental Regulations Revised

Amendment No. 9 to Maximum Price Regulation 134, Effective July 1, 1943.

NATIONWIDE rental ceilings on dump trucks were established by the Office of Price Administration.

The new regulation adjusts rental rates which experience showed were too high or too low. It also includes several new classes of equipment, and rewords misunderstood sections.

Dump truck rental prices (generally lower) are established in an appendix. Hourly maximum rates are

provided for fully-operated rental as well as three different dollars and cents figures for each size of truck. Capacity and type of loading determine the applicable hourly fixed charge. The lessor adds to the fixed charge 135 per cent of the operator's hourly wage in the area of the jobsite on March 31, 1942, to obtain his maximum hourly rental rate.

The rates allow for variables such as nature of loading device used, materials hauled, and distance traveled. Provisions are made for issuance of rates other than those established applicable to a specific area or to certain types of service where circumstances require adjustment to meet local problems. The adjustment features may be used where state laws conflict.

Other features include:

Establishment of "bare" rentals on the basis of a percentage of the value of a new truck which is the equivalent of the rented truck.

Ceiling monthly rental rates are set. The maximum weekly rate is one-third, and the maximum daily rate is one-twelfth, of the monthly.

Provision that all repair expenses due to normal wear and tear shall be met by the owners of the trucks, a feature which prevents "windfalls", owners of old trucks and trucks in poor condition.

Setting up of maximum rates for construction equipment mounted on automotive trucks or trailers. These rates are made up of the applicable maximum bare rental rate for the equipment, plus a percentage of the selling price new; 7 per cent for trucks and 5½ per cent for trailers.

Bringing of dump trucks and truck and trailer mounted construction equipment under one regulation and providing a basis for nationwide uniform ceilings.

Among the many changes resulting from this recommended regulation the following are the most important:

I. A new section (1399.14) includes these clarifying rules:

Where equipment is on bare rental and breaks down as a result of cause other than normal wear, lessor can charge lessee with repairs and with rental for possession during repair.

However, where equipment is on bare rental, the lessee may at his own expense always make minor repairs, regardless of the cause of breakdown, to keep the job going. But he may not charge the cost to lessor or deduct the time lost from rental period without lessor's consent.

Where there is a breakdown on

"fully operated" rental, the lessor cannot charge the lessee with any rental, or for any "operating and maintenance service," for the time lost, or with the costs of any repairs occasioned thereby.

II. "Coverage" section (1399.1) applies not only to regular rental but to all agreements for use of construction equipment, regardless of their form, except one class. Excluded are those agreements in which party furnishing equipment is an "independent contractor" i.e., one responsible to the other party only for a certain result, not the means.

III. "Maximum rate" Section (1399.2). Daily overtime is calculated on the basis of 1/16 of daily rate for each hour of actual use over 8 hours. Weekly overtime is on basis of 1/96 of weekly rate for each hour exceeding 48. No change in method of figuring monthly overtime.

IV. "Most favorable rate" section (1399.3) is clarified and combined with old section (1399.5). Regardless of contract basis, maximum rental must be determined at rate most favorable to lessee.

V. "Service rates" section now says:

(1) No one may legally make or receive payment for operating services in connection with construction equipment (or repair services), unless the person has filed a rate report with OPA and obtained approval.

(2) Regulation covers not only services furnished by lessors in rentals on a "fully operated" basis but also any repair, rebuilding or overhaul service for construction equipment furnished by any person, in shop or on job.

(3) Any one who has not heretofore filed rates with OPA, and obtained approval, must at once prepare a report and get rate established.

(4) OPA approval of an operating and maintenance service rate establishes the lessor's maximum charge only for work similar to that described in his report. For rates on dissimilar work, lessor must file anew.

(5) Anyone who claims sufficient hardship in the continued use of a maximum service rate for either operating and maintenance, or repair and rebuilding, services may file an application for adjustment by following prescribed procedure.

(6) No lessor is permitted to use as his charge for operating and maintenance services the difference between his "fully operated" rate and OPA "bare" rental rates. He must establish his rate by filing the necessary report.

Dundon President of Upper Michigan Group

T. S. Dundon, Luce County Highway Engineer, has been elected president of the Upper Peninsula Road Builders' Association in Escanaba. He succeeds W. C. Veale, Keweenaw County Highway Engineer.

George L. Depew, Alger County Highway Engineer, was elected vice-president, and Chauncey L. Marley, member of the Ontonagon County Road Commission, was chosen secretary-treasurer.

Construction Placed Under CMP Control

The War Production Board, on June 30, issued Controlled Materials Plan Regulation 6, covering the procurement of materials for construction purposes. This regulation according to advice from American Road Builders Association, places rigid control on "controlled materials" (steel, copper and aluminum). Details and classification of products manufactured therefrom, are contained in CMP Regulation 1.

"Construction" as defined in the new order, includes the erection, construction, reconstruction, restoration or remodeling of any structure or project or any extensions or alterations of the same.

In general, the regulation is to be used only for securing materials for construction. It sets up a scheduling method based on authorized construction, and allotments are made as in CMP Regulation 1, except that allotments may be identified by a digit or digits. No Class B product allotments are to be made under Regulation 6; these come under CMP Reg. 1.

Authority to construct facilities will continue to be necessary for every case where L-41 requires such authorization.

In maintenance or repair work, or minor capital additions, where there is no construction of the type which must be authorized by L-41, the needed materials may be secured under CMP Regulations 5 and 5-A. Forms found at the end of the order may be used to apply for allotments plus authority to construct.

An alternative procedure is laid down in Section (1) for simultaneous allotments. In such cases, the person who is to make the allotment must ask each supplier no matter what degree of remoteness, to file an application for an allotment with him directly, rather than with the supplier from whom he would otherwise receive his allotment.



Burlington, Vt., catch basin gratings are easily removed for cleaning

Removable Catch Basin Gratings of Interesting Design

Some years ago George C. Stanley, city engineer and street superintendent of Burlington, Vt., devised his own catch basin design. It consists of a cast iron frame which is anchored in the concrete gutter (see photos), and a removable grating made of round stock steel bars welded to two steel side plates. The frame is supported on lugs.

This catch basin has the advantage that it cannot be damaged by freezing, is heavy enough to support truck wheels (or even a 10-ton roller) and can be reset at any time. Experience with the round grating bars has borne out Stanley's theory that round shapes facilitate the passage of leaves, dirt and debris. Several hundred of these gratings have been made at a

local foundry and installed since 1933. The cost has ranged from \$15 to \$20 each, depending on prevailing foundry quotations in various years.

The complete catch basin, as successfully used in Burlington, includes the unpatented "Stanley Elbow Sewer Trap," also made locally at a reported cost of \$10 to \$14 each. Used in conjunction with combined sewers, this water-tight, gas-tight design includes a specially designed machine-fit cover. It can be opened as a straight-away clean-out to the manhole. (All catch basins in Burlington lead directly to manholes.)

The catch basin structure includes a trap placed 3½ ft. down from the top of a 7-ft.-deep basin. Accumulated dirt is pumped from the sump with an "Elgin Eductor."



Burlington's elbow sewer trap, especially designed for catch basins. The machined faces of shoulder and cover give a perfect fit, and with water-grease form a tight seal and prevent rusting. Lugs on trap wall are for anchoring into the catch basin bricks. Lugs on inside of cover engage the slot shown on top shoulder and permit tightening of cover with a heavy wrench

World's Greatest Timber Structure

By HOLMAN HARVEY

THE recent announcement by the War Production Board, that structural timber using modern fabrication methods saved 400,000 tons of steel last year, has been followed now by the disclosure that the Navy has employed this system of construction to build the world's largest hangar for non-rigid airships.

All of the timber in the hangar—more than three million feet in arches and roof sheathing—is pressure-treated with a mixture of ammonium and boron chemicals to make it flame-proof. The hangar is the first large-scale use of fire-resistant wood to replace steel.

In this structure, now nearing completion "somewhere in the U. S.," soaring timber arches rise 153 ft. from the floor, clear-spanning an area 237 ft. wide and 1,000 ft. long. The greatest structure ever erected of timber at any time in any place, this multiple-truss building is designed and engineered as a permanent naval installation, not as a temporary structure.

While structural timber was selected originally in order to conserve steel, from the standpoint of pure engineering interest it is only incidental that 2,050 tons of structural steel was saved. Of greater interest is the role of the connector along with other refinements in timber engineering, without which such a large wooden structure could not have been designed.

The timber connector is an implement for stress dispersal especially adapted to timber construction. Starting with the split ring as the most versatile type of the group, timber connectors include toothed rings, claw plates, shear plates, and grids, one or another of which types is suitable for joining wood to itself or to any other structural material. War has given impetus to the wider use of connectors since one lb. of steel in the form of connectors and accompanying bolts, washers, and other hardware, takes the place of 13.4 lb. of structural steel.

In developing the connector it was

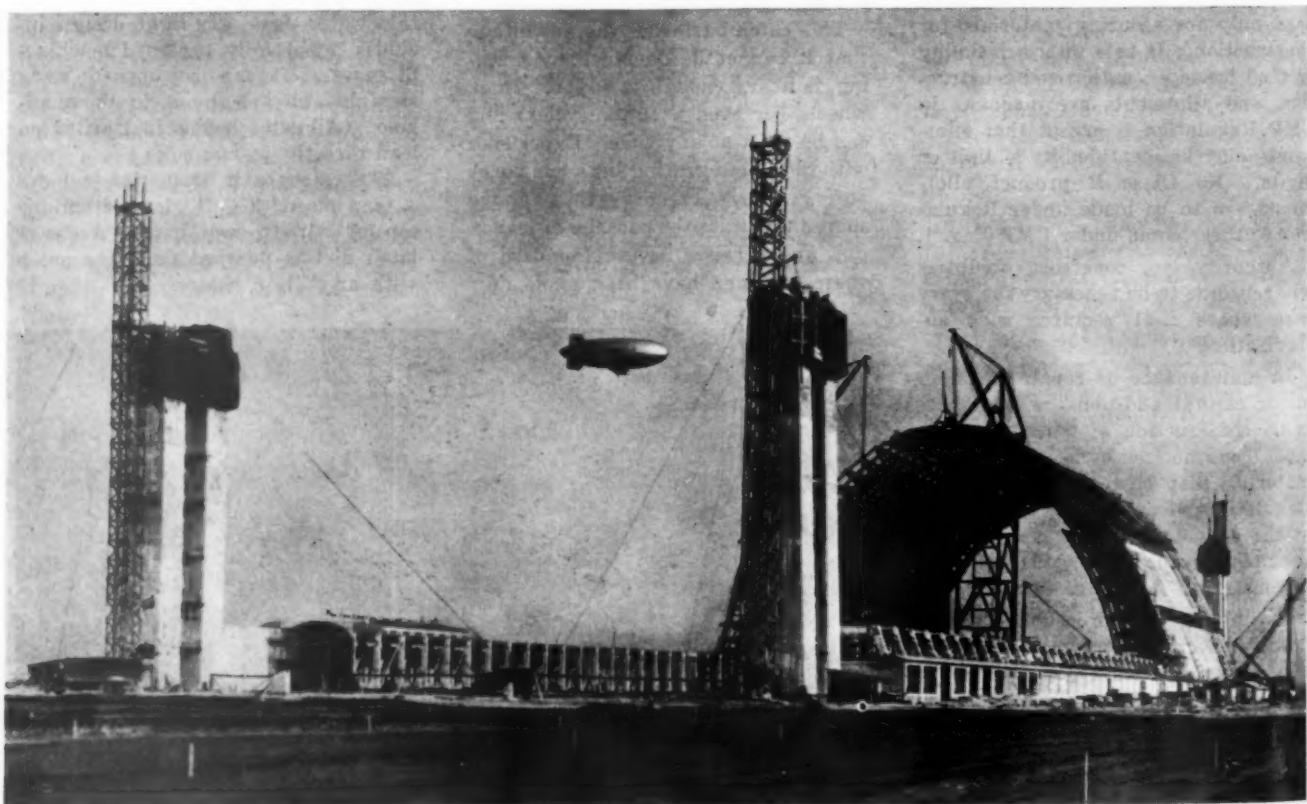
necessary to create efficient portable and non-portable high-speed tools for precision grooving of the timber preparatory to installing connectors. The original research on connectors was conducted by the Forest Products Laboratory of the U. S. Forest Service.

WPB Eases Restrictions on Certain Equipment

Restrictions on deliveries of certain items of construction machinery for civilian use were eased somewhat by the War Production Board, July 2.

By making changes in Schedules A, B and C of Limitation Order L-192, post hole diggers, hand carried concrete surfacing machines and "finishers and rodding machines for wet concrete" were made available for civilian as well as military use.

A number of other minor changes were made in the description of items in the Schedules for the purpose of clarification.



World's greatest timber structure nearing completion somewhere in U. S. Clear-span timber arches rise 153 ft., provide 237-ft. unobstructed opening. Length: 1,000 ft.

How District of Columbia Uses Dark Concrete

By H. C. WHITEHURST

Director of Highways, District of Columbia,
Washington, D. C.

It has been the policy in the District of Columbia to darken concrete when the pavement being constructed is in an area in which bituminous surfaces predominate. Too, the carbon does reduce the glare which is considered quite desirable in many locations. Some pavement projects in which Army authorities have been interested have been darkened at their request to reduce the visibility of the roadway from the air. The cost of darkening concrete surfaces is small and this step has met with favorable comment in this city.

Given below are our specifications for darkening concrete. Our tests have indicated no reduction in strength when the amount of material used does not exceed 4 per cent of the weight of the cement. Note that only approximately 25 per cent of the emulsion is carbon so that, in fact, not more than one per cent is incorporated in the mix. The amount required does vary with the particular cement being used, however; 3 per cent will produce a uniform color for most cement. The carbon is very uniformly disseminated throughout the concrete when used in the emulsion form and requires no special mixing.

D. C. Specifications for Darkened Concrete Pavement

The cement concrete pavement shall be darkened for a depth of at least 3 inches by including in the concrete mix carbon emulsion in a quantity not less than 3 nor more than 4 per cent by weight of the cement content. The concrete in the curb shall not be darkened and the contractor shall use care to prevent the darkened concrete for the pavement from mixing with the concrete for the curb. The entire operation of the use of the carbon emulsion and the placing and finishing of the concrete shall be carried on so that the shade of the finished surface shall be uniform. To prevent staining or discoloring of the pavement surface, the contractor shall use clean burlap and take every precaution to keep the surface of the pavement clean in order to obtain a uniformly black color. The cost of furnishing and placing carbon emulsion shall be

included in the price bid per square yard of concrete pavement.

D. C. Specifications for Emulsified Carbon Black

Emulsified carbon black shall be a uniform colloidal dispersion of standard carbon gas black in a liquid medium. At least twenty-five (25) per cent by weight of the commercial product shall be carbon black. The

product shall be free from lamp black, mineral black, silicas, asbestine, talc, bone black or other fillers. Emulsified carbon black shall contain no substance which can adversely affect the strength, durability or appearance of concrete or mortar when used in concentrations necessary to produce the desired color. The emulsified carbon black shall be so finely processed and dispersed that when one part of the product is stirred into ten parts of water the resulting liquid shall, upon standing without agitation for seventy-two (72) hours, remain uniformly colored from top to bottom. The emulsified carbon black shall be delivered to the job in sealed containers plainly marked with manufacturer's name and address, together with the trade name of the product.



Massachusetts Ave., N.W., where darkened concrete was used on roadway and regular finish on curb and gutter



Darkened concrete on service roadways of K Street, in mid-town Washington. Central roadway and intersections are sheet asphalt

DIGGING IN DOWN UNDER...



This metal-muscle rock drill worked for MacArthur's engineers, "down under" where camps and bases were clawed out of the wilderness overnight.

Like all Worthington Blue Brute† Rock Drills and Air Tools, this rock drill (WJ-15) is fast but *easy-breathing*, rugged but easier-handling than other rock drills of its size and power.

Use 'em yourself, you'll find that the blue is on the brute, not in the air — for you don't waste cuss words on a tool that

doesn't balk, "talk back" or loaf on the job.

Blue Brute Compressors, too . . . portable and semi-portable, gasoline, Diesel, and electric-driven . . . will save you time and good hard cash. Their "throats", smoothed by time-tested Feather Valves* . . . *deliver more air* for less money under toughest service conditions.

Ask for a Blue Brute air-power team, best for your money. Get a demonstration now, on your present job!

*Reg. U. S. Pat. Off. †Blue Brute Compressors and Air Tools are painted olive drab for the Army and battleship gray for the Navy until Victory.

Behind the Fighting Fronts with

BLUE BRUTES

Blue Brutes today support the fighting front in Tunisia, just as they helped the British 8th Army turn back Rommel from the Nile. In the U. S., they provide air power for thousands of industrial operations, as well as construction projects, in Navy Yards, Army Camps, Air Bases and Ordnance Plants throughout the country. Your nearest distributor is listed on page 55.

Get more **WORTH** from air with **WORTHINGTON**
BUY BLUE BRUTES



WORTHINGTON



Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts

compressors from 60 to 500 cu. ft. capacity in mounts to suit all jobs. Rock Drills and Air Tools that have

always set the pace for easy operation — available in a wide range of weights and sizes.

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service
on **BLUE BRUTE** Portable Compressors,
Rock Drills and Air Tools.
See full page ad page 54.

ALABAMA
Birmingham—Tractor & Equipment Co.
ARIZONA
Phoenix—Smith Booth Usher Company
ARKANSAS—Fort Smith—R. A. Young & Son
Little Rock—R. A. Young & Son
CALIFORNIA
Los Angeles—Smith Booth Usher Company
San Francisco—Edward F. Hale Company
COLORADO
Boulder—Standard Machine Works
CONNECTICUT
Hartford—The Holmes-Talcott Company
GEORGIA
Atlanta—Tractor & Machinery Co., Inc.
ILLINOIS—Chicago—Kennedy-Cochran Co.
INDIANA
Indianapolis—Reid-Holcomb Company
IOWA—Des Moines—Electrical Eng. & Constr. Co.
Davenport—Industrial Engineering Equipment Co.
KENTUCKY—Harlan—Hall Equipment Sales
Louisville—Williams Tractor Company
LOUISIANA
New Orleans—Wm. F. Surgi Equipment Company
MAINE—Ellsworth—Murray Machinery Co.
MARYLAND
Baltimore—D. C. Elphinstone, Inc.
MASSACHUSETTS
Boston—P. I. Perkins Company
Cambridge—W. W. Field & Son, Inc.
Springfield—The Holmes-Talcott Company
MICHIGAN
Detroit—W. H. Anderson Company, Inc.
MINNESOTA
Hibbing—Arrowhead Equipment & Supply Co.
Minneapolis—The George T. Ryan Company
MISSOURI
Kansas City—Machinery & Supplies Company
MONTANA—Helena—Caird Engineering Works
NEW HAMPSHIRE
West Lebanon—P. I. Perkins Company
NEW JERSEY
Irvington—Smith Tractor & Equip. Co., Inc.
NEW MEXICO
Albuquerque—The Harry Cornelius Company
NEW YORK
Albany—Larkin Equipment Company
Albany—T. Southworth Tractor & Machy. Co., Inc.
Menands
Binghamton—MacDougall Equipment Co.
Buffalo—Dow & Company, Inc.
Corona, L. I.—The Jaeger-Lembo Machine Corp.
Middletown—S. T. Randall, Inc.
New York—Hubbard & Floyd, Inc.
Olean—Freeborn Equipment Company
Oneonta—L. P. Butts, Inc.
Syracuse—Harrod Equipment Company
NORTH CAROLINA
Durham—Constructors Supply Company, Inc.
OHIO—Cincinnati—The Finn Equipment Company
Cleveland—Gibson-Stewart Company
Marietta—Northwest Supply & Equipment Co.
Toledo—M. W. Kilcorse & Company
OKLAHOMA
Oklahoma City—Townaco Equipment Co.
OREGON
Portland—Andrews Equipment Service
PENNSYLVANIA
Easton—Sears & Bowers
Harrisburg—N. A. Coulter
Oil City—Freeborn Equipment Company
Philadelphia—Metalweld, Inc.
Pittsburgh—John McC. Latimer Company
Wilkes-Barre—Ensminger & Company
SOUTH CAROLINA
Columbia—Bell-Lott Road Machinery Co.
SOUTH DAKOTA
Sioux Falls—Empire Equipment Co.
TENNESSEE
Knoxville—Wilson-Weener-Wilkinson Co.
Memphis—Tri-State Equipment Company
TEXAS—Dallas—Shaw Equipment Company
San Antonio—Patten Machinery Company
VIRGINIA
Richmond—Highway Machinery & Supply Co.
WASHINGTON
Seattle—Star Machinery Company
Spokane—Andrews Equipment Service
WEST VIRGINIA
Fairmont—Interstate Engineers & Constructors
WISCONSIN
Eau Claire—Bradford Machinery Company
Green Bay—Nelson Machinery Company
Madison—Western Equipment Company
WYOMING
Cheyenne—Wilson Equipment & Supply Co.

Get more **WORTH** from air with
WORTHINGTON

Buy Blue Brutes

Worthington Pump and Machinery Corp.

\$100,000,000 Needed to Restore Massachusetts Highways

More than \$100,000,000 will be needed to put Massachusetts highways into proper condition after the war, according to estimates of Herman A. MacDonald, State Commissioner of Public Works.

Latin American Motor Transportation Expanding Fast By R. D. HILTY

Vice President and Export Manager,
Mack-International Motor Truck Corporation

The milestones that Latin America will pass in the post-war world are unpredictable, but one thing is certain—increased, modern transportation is going to play a major role in our southern neighbors' new era. The gains being made by American-made merchandise, and the increasing interest of U. S. manufacturers in Latin America are good omens for increased post-war reciprocal trade.

The highway systems in these countries are being expanded rapidly, and are now at the point U. S. highways were twenty years ago. At that time there were only 1,117,000 trucks operating in the United States. Today Latin America is not far behind the U. S. total for 1923, with approximately half a million trucks.

Highway building has been so speeded up that roads are now built twice as fast as in the 1920's. This speed-up and the greater awareness of Latin America to the need of improved transportation should lead to the shipment of close to a million and a half truck and bus units to these countries in the next ten years.

At the same time the U. S. government will be supplying cash, credit

and technological "know how" to Latin America side by side with private enterprise. The roots of this expanded program stem from the recent establishment by your government of the Office of Foreign Investment Information, which will make American dollars available to Latin America through Eugene Le Baron, its director.

Meanwhile, basic industrial planning for Latin America has begun under the auspices of the inter-American development commissions headed by Nelson Rockefeller. Also, the 21 Pan American nations have established their own Inter-American Development Commission, headed in this country by Eric Johnston, U. S. Chamber of Commerce president, and elsewhere by leading Latin American businessmen.

Cincinnati Labor Saver

The city of Cincinnati is benefiting today from a judicious policy of building up its equipment. Its fleet of some 500 major mechanical units in the Highway Maintenance Department includes several improvised or shop-altered machines designed primarily to save labor.

One prime labor saver—and a unit every city can easily rig up if it hasn't one or more already—is a heavy-duty truck-mounted crane. Shown setting heavy sections of granite curb is one such unit which comprises a 4000-lb. capacity boom-type chain hoist mounted on a 5-ton truck. It includes a power travel. One man can take this unit out and pick up such equipment as small sand spreaders, etc., which otherwise would require a driver and several men to load.



Truck mounted crane saves many man-hours per month

ROADS AND STREETS, July, 1943

Editorial

HIGHWAY LOAD LIMITS

ONE of our postwar problems is also an immediate one. It's the matter of highway load limits.

Millions of dollars worth of road surfaces are going to pieces from overload because of the inability to cope with maintenance demands under war conditions and because normal reconstruction is practically stopped. Many miles of overburdened roads which are standing up so far will nevertheless someday present a "bill for war damages" by deteriorating before their time. Articles in this issue on an Ohio resurfacing project and on Illinois' state-wide patching program are specific examples of how states are coping with their extraordinary maintenance problem. Future issues of *ROADS AND STREETS* will carry similar stories.

The 9,000-lb. emergency axle load maximum agreed on between the states as a war measure isn't the culprit in most cases. This load is at most only a thousand pounds or so higher than the prevailing design limit. Damage has been accelerated by the increase on some routes in trucking in the upper weight brackets, and the high speed of these heavy units. But the real trouble makers are the very heavy "special permit" overloads and the truckers who are getting by with murder through laxity in load limit enforcement.

In Illinois last year nine thousand excess load permits are said to have been issued, which isn't mentioned as criticism of any public officials but to show

the magnitude of the wartime problem of cooperating with industry. As we go to press a bill awaits Governor Green's signature which increases to 18,000 lb. the legal axle loading on buses with hydraulic shock absorbers and 10-lb. per-in. balloon tires and sanctions heavier gross semi-trailer loads. This is just one more chapter in a long battle to get weight limits relaxed in Illinois, where nearly the entire highway system is designed for 16,000-lb. axle loading. Other states, too, we hear, are revising their load statutes upward. Two pieces of work lie ahead. One is to see what can be done in some states to tighten up on weight limit (and truck speed) enforcement without interfering with the war job. A lot of money could thus be saved.

Another is to review the question for what loads (and speeds) pavements must be designed and built after the war. This calls for some big-time thinking. In a coming era when cargo planes and a revitalized railroad system will compete fiercely with highway transportation on many fronts, this nation will surely emerge with a heavier duty highway system. Will a 9,000-lb. wheel load be the standard maximum, or what? It isn't too soon for tire and truck manufacturers to be getting together with highway designers and deciding where to freeze axle load maximums and other basic factors.

CONTRACTORS: GET BEHIND ARBA PROGRAM

THE fightin' spirit of road contractors in regard to the postwar program is a good sign. The recent meeting of the Contractors' Division of the American Road Builders' Association at Philadelphia was one of the most successful this Division ever held. Its purpose was to devise action which will assure contractors a chance again to prove their resourcefulness and efficiency on a big scale under the contract system.

Under President James J. Skelly a nation-wide promotion program was adopted and this summer Messrs. Skelly, Upham, O'Brien and others are out campaigning throughout the country to obtain the active cooperation of all persons engaged in the construction industry. Letters have been written to every road or other heavy contractor in the country. An educational program will be carried to business leaders and the general public through newspapers, magazines and by mail.

Their purpose isn't just to help public officials sell the need of an after-war highways and public works program as a means of giving employment and providing needed facilities, but also to show the necessity of *getting going on detailed plans now.*

Mr. Skelly in presenting the alternative didn't mince words. He pointed out that "if a program is not prepared for the postwar period this country would again be faced with another gigantic WPA or other form of work-relief that would result in the ruination of private enterprise and individual initiative in this country".

He further reminded that it is not only the patriotic duty of every member of the construction industry to fight against such a program, but its defeat is vital to building up private enterprise and business health. And fighting means crystallizing public opinion, and thus aiding county, state, city and other local people in their current planning efforts. During the depression federal officials were mostly right when they defended work-relief on the score that local governments weren't ready with detailed plans.

If you hope to be a contractor after the war, *get behind this program!*

It's your chance to help yourself, and to do your country a big favor, because each additional project that reaches the "blueprints ready" stage during the war may mean just that much less need for a new WPA someday.

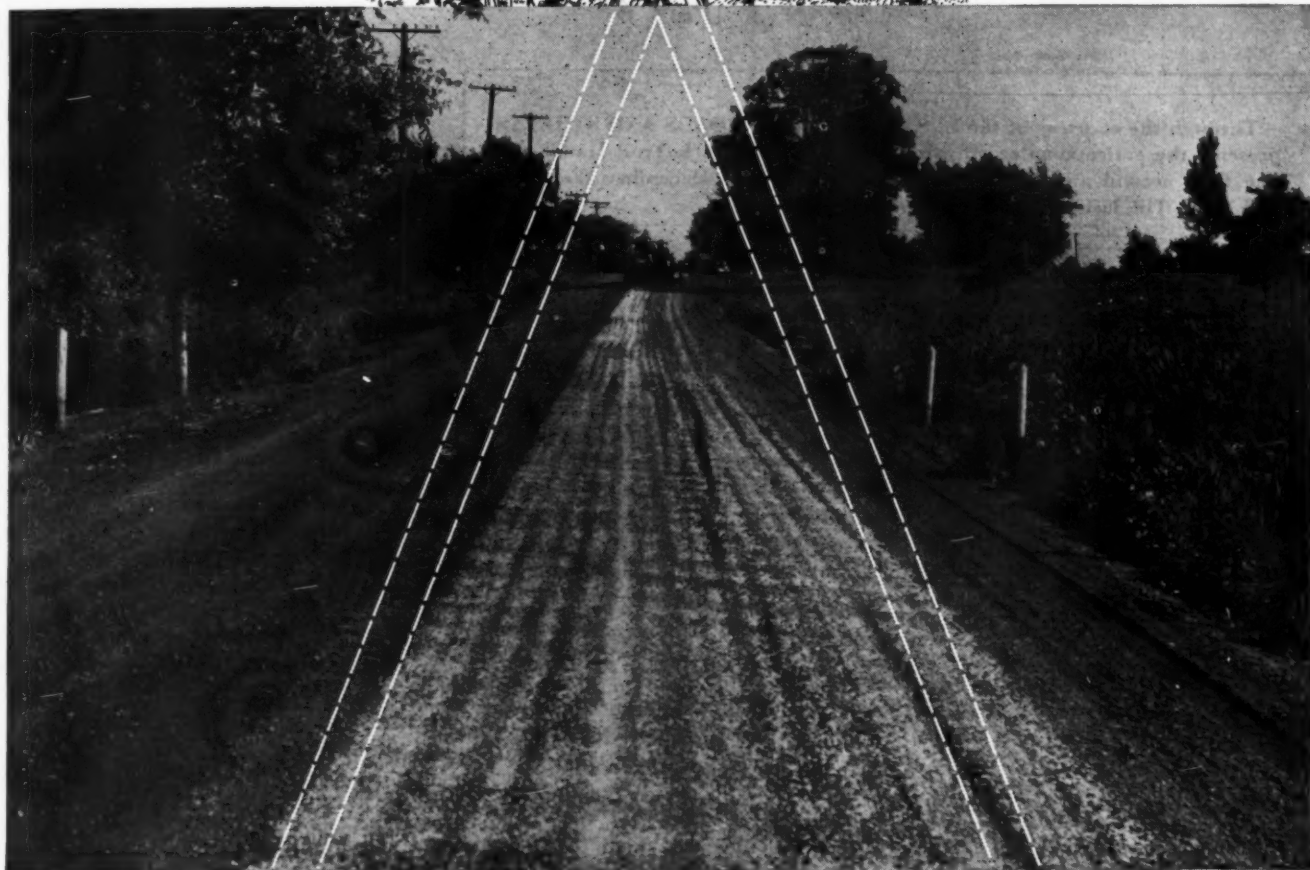
ON PRESERVING OLD ROADBEDS

A BIT of philosophy for stretching maintenance funds comes from C. L. Motl, maintenance engineer of the Minnesota highway department. One of his principles in patching or strengthening a failing road surface is to "put your new material on top of what's already there". Disturb or excavate as little as possible.

"Figure out what it costs to dig out and replace and you'll often find that it pays to leave the old roadbed un-

disturbed," he says. "We often recommend holding weakened material in place on bituminous roads by covering it over, even where sufficient new material leaves a slight hump."

Of course there comes a time when this rule, like any other, isn't the solution. But it's something to keep in mind these days.



These Life-Line Roads MUST Be Maintained!



Meat, dairy products, grain, vegetables — all the foodstuffs so vital to keep our armed forces in fit fighting condition and our war workers at top production — start their journey over farm-to-market roads. Trucks that carry this ammunition to processing and distribution centers must move safely and surely in any weather, and their contents must not be contaminated by dangerous dust. ¶ Consolidation and

dustproofing of gravel-type roads with clean, odorless, easy-to-apply calcium chloride provides this essential protection at extremely low cost. Tire wear is reduced, gasoline mileage increased and the highway department saves manpower and equipment, since blading is cut up to 90% and road materials are conserved. Write for free bulletin on "Surface Consolidation and Maintenance with Calcium Chloride."

CALCIUM CHLORIDE ASSOCIATION, 4145 Penobscot Building, Detroit, Mich.

EXPLOSIVES

A Chapter from the Truck Trail Handbook of United States Department of Agriculture — Forest Service

Part 4

Through the courtesy of the U. S. Forest Service, **ROADS AND STREETS** presents the entire chapter on explosives from the *Truck Trail Handbook*. The first, second and third parts were published in December, February and April. The last installment is given herewith.

The Editor.

808. Transporting Explosives A. Regulations, Federal, State, and Local

Any person having occasion to handle or use explosives should familiarize himself with all Federal, State, and local laws and regulations and comply with them.

The Federal Act of March 4, 1909, revised March 9, 1921, provides in Sections 232, 233, 234, 235, and 236, that it is a criminal act:

1. To carry, or to cause to be carried, any explosives (other than the exceptions named) in a train, boat, trolley, or other vehicle carrying passengers for hire; or
2. To deliver, or cause to be delivered, to a common carrier for transportation any explosives under false or deceptive marking or description on the package, invoice, or shipping order; or
3. To violate, or cause to be violated, any regulations of the Interstate Commerce Commission relating to the marking, shipping, or handling of explosives.

4. A violation of any of the provisions of this law is punishable by fine of not more than \$2,000, or by imprisonment of not more than eighteen (18) months, or both; or, if injury or death results from such violation, by fine of not more than \$10,000, or by imprisonment for not more than ten (10) years, or both.

B. Unloading Freight Cars

An inspection should be made on arrival of the car to ascertain the condition of its contents. Occasionally, rough handling in transit may telescope cases or break them open so that there will be loose explosive between cases or on the floor. If inspection reveals such a condition the

workmen unloading the car should be warned to avoid every chance of friction against the loose explosive. As soon as a sufficient number of cases have been removed from the car to make it feasible, the loose explosive should be carefully swept up and burned. See 807, Destroying Old Dynamite and Caps for disposal by burning.

Cases containing explosives should always be lifted and set down carefully; never slide them over one another or drop them.

Bale hooks or other metal tools should never be used for loading or unloading explosives.

C. Transportation by Truck

The vehicle provided to transport explosives from the railroad to the magazine should be strong and substantial and in good working order. A closed body is best. If an open-bodied vehicle is used, the ends and sides should be high enough to prevent packages of explosives from falling off, and the load should be covered with a fire-resistant tarpaulin. The floor should be of wood, and any metal in the body likely to come in contact with the cases should be covered with wood.

A truck should never be overloaded with explosives, nor should packages of explosives be placed in such a position that they may fall off.

Blasting caps should never be transported in the same bed or body of the vehicle with explosives, nor should metal tools, carbide, oil, matches, firearms, electric storage batteries, inflammable substances, nor acids, oxidizing, or corrosive compounds. Explosions have occurred on vehicles transporting explosives with some of these commodities.

The truck for transporting explosives should be driven by, and be in

charge of, a driver who is careful, capable, reliable, able to read and write the English language, and not addicted to the use of intoxicants or narcotics. He should never smoke while on or near the truck, nor carry matches, firearms, or loaded cartridges. He should know and comply with road rules and State laws as well as with local ordinances and regulations covering explosives in the cities or other municipalities through which it is necessary to travel. He should have the truck always under complete control and should never coast down hill. He should, of course, be familiar with the proper manner of handling explosives.

All trucks hauling explosives shall post conspicuously, both front and rear, the sign **EXPLOSIVES** with lettering of 1-inch width stroke and not less than 6 inches high. In addition, they shall carry two red flags not less than 12 inches square on either side near the front.

All trucks transporting explosives must be equipped with an adequate fire extinguisher. The extinguisher should be accessible at all times and tested frequently.

Unauthorized persons should never be permitted to ride on trucks transporting explosives.

When transporting explosives, the truck should come to a full stop before crossing any railroad track and should not attempt to cross the track until it is known that the way is clear and that a train or engine is not approaching.

The truck engine should always be stopped while the gasoline tank is being filled.

A truck containing explosives should never be left without stopping the motor and securely setting the brakes. When transporting explosives over the highways, it is advisable to avoid unnecessary stops. Stop for meals should be made at a wayside restaurant and the truck should be left well away from traffic and parked vehicles. A truck containing explosives should never be taken into a garage or repair shop.

Explosives should be left only in a magazine and locked up, or delivered to a person authorized to receive

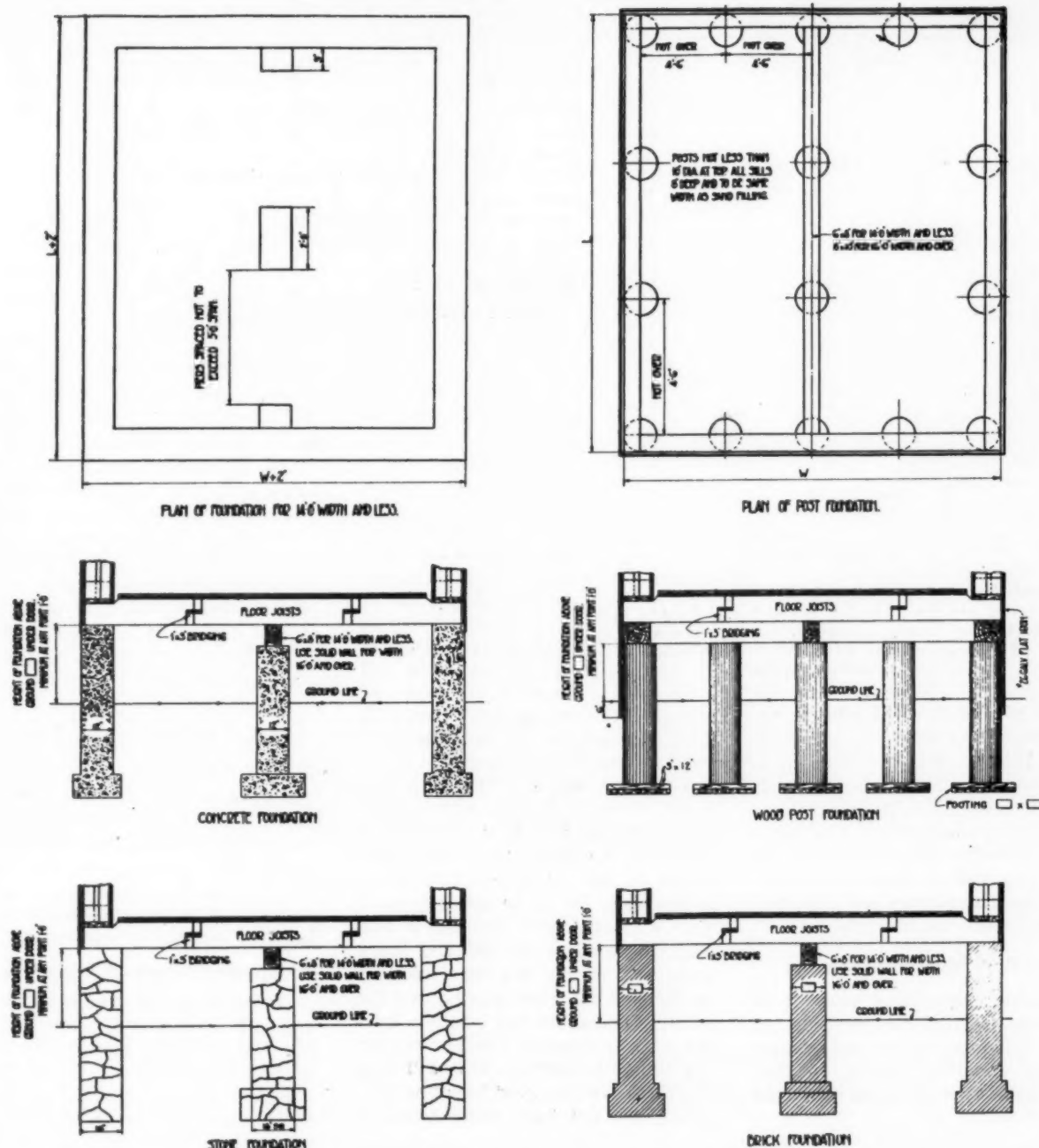


Fig. 808. Standard sand-filled magazine foundations

them. In unloading, packages of explosives should never be piled immediately back of the exhaust, as a spark may start a fire and cause an explosion.

It is safer to transport explosives in daylight. If lights other than the truck lights are necessary, only an electric flashlight or an electric lantern should be used.

809. Storing Explosives

A. Importance of Proper Storage

See figure 808. The proper storage of explosives is much more important to safety in their use than is commonly realized. Improper storage of

explosives and detonators leads directly to:

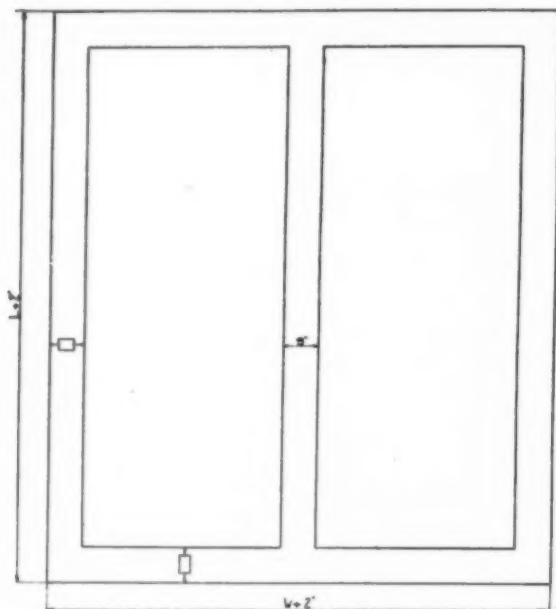
1. Misfires.
2. Incomplete detonation, which leaves unexploded dynamite in the bore hole or thrown out among the blasted material.
3. Burning of charges in the bore holes.

A dilapidated magazine, or a magazine with floors close to wet ground, or any condition of storage which would expose ammonium nitrate explosives or blasting caps to moisture is almost sure to cause trouble. Even a small leak in a magazine roof may allow a few cartridges to become wet, and the use of these cartridges may

result in either misfire or incomplete detonation.

Inadequate ventilation of magazines may also lead to misfires or incomplete detonation. Unless air circulates freely through a magazine, the atmosphere may become hot and humid. Long exposure to such atmosphere has much the same ultimate effect as dampness upon ammonia explosives and blasting caps. With nitroglycerin explosives, it tends to cause separation of the nitroglycerin from the other ingredients, or leakiness, that makes the explosives much more sensitive, and hence dangerous to handle.

The handling of misfires, and the



PLAN OF FOUNDATION FOR 16'0" WIDTH AND OVER.

Foundations may be concrete, brick, stone, or posts, to extend into ground to below frost line and until good bearing material is reached. Footing not less than 6 ft. wide by 9 ft. deep and as much more as local conditions require

existence of undiscovered misfires or of unexploded dynamite in the bottoms of holes or in the broken material, constitute some of the chief sources of accidents. For this reason, it is imperative to prevent deterioration of explosives and detonators in storage. Dry, well-ventilated, and reasonably cool magazines are essential to safety in the use of explosives.

B. Location of Storage Magazines

Where no State laws exist, it is recommended that the location of storage buildings be in accordance with the American Table of Distances. Some excerpts from this table follow:

TABLE 805. REQUIRED DISTANCES BETWEEN BUILDINGS STORING EXPLOSIVES AND INHABITED BUILDINGS, RAILWAYS, AND HIGHWAYS

Quantity of explosive stored Pounds	Inhabited buildings Feet	Distance from storage building ¹ Public railways Feet	Public highways Feet
From 100 to 200	180	110	55
500 " 600	400	240	120
1,000 " 1,500	530	320	160
1,500 " 2,000	600	360	180
5,000 " 6,000	780	470	235
10,000 " 15,000	890	535	265
20,000 " 25,000	1055	635	315
40,000 " 45,000	1340	805	400

¹ These distances hold for barricaded storage buildings, that is, the building containing explosives is screened by either natural or artificial barriers. When barriers do not exist, the distance should be doubled.

C. Storage of Caps

Electric caps or detonators should be stored in a separate magazine not less than 100 feet from the powder magazine.

The wires of all electric caps should have their exposed ends twisted to-

gether to prevent any possible electric current, static or otherwise, from causing a premature explosion. These twisted ends should not be untwisted until everything is ready for the final wiring a short time before firing the round.

D. Storage of Explosives on Projects

Powder for going projects should be stored behind such natural barricades as heavy timber, ravines, etc. The area surrounding such caches should be adequately posted with EXPLOSIVES signs. For small quantities a portable magazine may be constructed of 2-inch planks or of shiplap covered with heavy flat iron and mounted on skids or

wheels. The word EXPLOSIVES should be painted on all four sides and the top of the structure.

A wooden box, with heavy double board hinged lid, built with hollow sides, the center to hold from 1 to 5 boxes of explosives, has been found useful on the job. The hollow space of the walls should be approximately 4 to 6 inches thick. For safety and uniform temperature fill the space with sand or dry soil. The soil may be dumped out when moving and the walls refilled at the new location. During cold or freezing weather replace the soil with sawdust. This will keep the explosive in a good handling condition. Do not bury small boxes or

other magazines in damp soil as moisture is detrimental to most explosives.

E. Permanent Storage Magazines

Permanent magazines for storage of explosives in quantity should be

constructed from approved plans which can be obtained from explosive manufacturers.

Magazines holding in excess of 50 pounds shall have no openings except for ventilation and entrance. The doors of magazines shall have an inside lock and, when not in use for loading and unloading, be kept locked at all times. Signs with letters not less than 6 inches high shall be conspicuously posted with the words MAGAZINE — EXPLOSIVES — DANGEROUS.

Doors shall be not less than 3 feet wide and 6 feet high made of 3 inches of wood and covered on the outside by ¼-inch steel plate firmly secured to the door by bolts.

The foundation shall be firm material that will not settle with the maximum weight. The posts may be wood, brick, stone, or concrete and of such height as will insure 1 foot of ventilating space between the ground level and the floor joists. The magazine must be well ventilated. All ventilating openings shall be covered with a No. 6 gage, ¾-inch-mesh wire screen.

810. Safety in Handling Explosives

A. Safety First

Explosives should always be handled with care, and familiarity must not lessen caution. They can be used safely when treated with due regard for their properties, but are apt to cause explosions and accidents if handled roughly or carelessly.

B. Opening Cases of Explosives

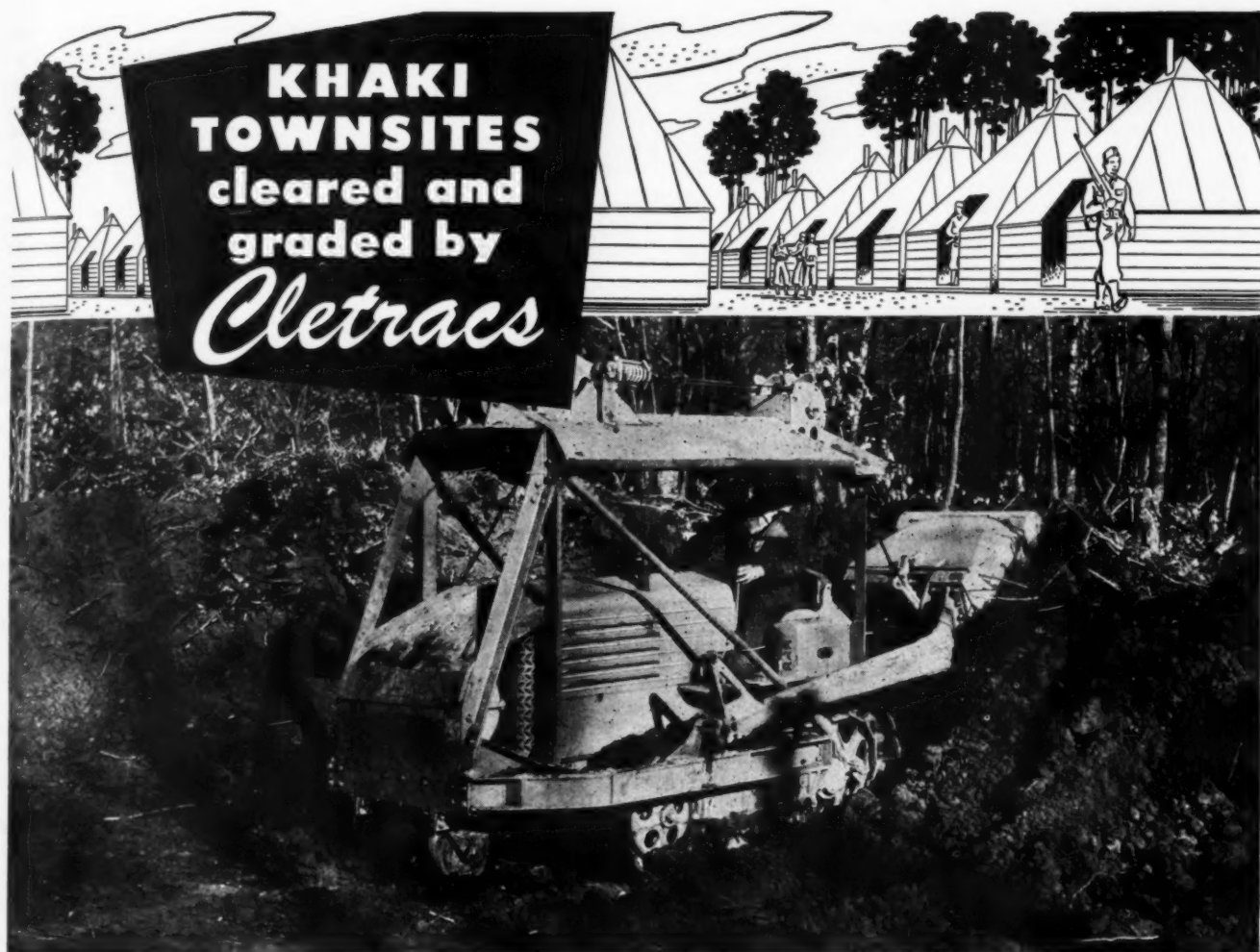
Dynamite boxes should be opened carefully. Dropping dynamite cases to burst them open is both inefficient and dangerous.

Safety demands the use of wooden tools without any metal whatever about them since steel or iron tools, such as hammer, sledge, chisel, pick, or drill steel may strike a spark from the nails and cause the dynamite to explode. While many dynamite cases are opened by metal tools every year without accident, the hazard is always present and any workman who uses a metal tool for this purpose is exposing himself to possible injury or death. Wooden tools eliminate this hazard and are just as effective. It takes a little forethought to have them at hand when needed, but the prevention of accidents is worth some effort. Any wooden wedge and mallet will serve.

C. Thawing Frozen Explosive

Because most dynamites are manufactured on a low freezing formula, the hazard of thawing them is largely

KHAKI TOWNSITES cleared and graded by *Cletracs*



• Khaki towns—temporary homes for the boys of our armed forces during their training periods—have been built from coast to coast. In many instances these towns seem to have been built overnight.

The important preliminaries of clearing and grading the sites for many of these encampments have been done by Cletracs with supplementary equipment, such as the Sargent loader illustrated above. Bulldozing, hauling, tree-felling, earth moving, road building—whatever

the job, no matter how tough—you'll find Cletracs more than adequate.

The sturdy make-up, rugged power, and enduring qualities built into Cletracs are doubly appreciated today when equipment is difficult to replace.

Keep your Cletracs in fighting trim with frequent inspection, proper lubrication, and prompt repair or replacement of worn parts. Call on your Cletrac dealer for his experience, facilities and personnel . . . Ask for his advice and suggestions.



THE CLEVELAND TRACTOR COMPANY • CLEVELAND, OHIO

Cletrac Crawler Tractors

GASOLINE AND DIESEL



avoided. However, if in cold weather the dynamite becomes hard, it must be thawed or it may explode prematurely. It must be borne in mind that thawing dynamite is a hazardous undertaking. Always use a two-compartment thawer which can be procured from any manufacturer of explosives. A thawer consists of a watertight compartment for holding the dynamite and a receptacle for hot water which surrounds the dynamite compartment. Under no circumstances should the water be heated in the thawer, as there is danger of firing any nitroglycerin left in or on the walls of the thawer from previous use. Dynamite when warmed exudes nitroglycerin readily which may stick to the vessel. The water should be heated in a separate pan to a temperature comfortable to the immersed hand. It is too hot if it burns the hand and should be cooled before putting into thawer. The dynamite compartment must be kept dry and clean, and the explosive must not come in contact with water. Should any of the ingredients of dynamite leak out into the thawer, it should be thoroughly cleaned with a solution of sal soda. The thawer should be kept away from stoves and fires at all times.

D. Safety Rules for Handling, Storing, and Using Explosives

1. Explosives should be kept in a clean, cool, dry, and well-ventilated place.
2. All storage of explosives must be in accordance with the American Table of Distances.
3. Always store cases of stick explosives with the bottom side down. Do not allow the cartridges to stand on end.
4. A complete record of explosives should be kept. This includes the amounts and the person to whom issued.
5. Always inspect a car delivering a shipment of explosives to ascertain the condition of its contents. If broken cases are found, remove the good cases and sweep up and burn the broken ones at a safe distance.
6. Do not smoke while handling or transporting explosives. Do not handle explosives or make primers where there are open fires, flames, lights, or any danger of sparks.
7. Do not transport electric blasting caps with other explosives. Keep them separated until ready to make primers or load a hole.
8. Electric blasting caps of differ-

ent manufacture should not be used in the same round.

9. Handle explosives and make primers during daylight hours only, if at all possible. If necessary to use artificial light, use only electricity.

10. Do not roll or slide packages of explosives roughly or drop them to force open. Lift and set cases down carefully. Do not nail up broken cases containing explosives.

11. Do not leave explosives or blasting caps uncovered, exposed to the direct rays of the sun, or accessible to children, unauthorized persons, or animals.

12. Do not make primers in a magazine where explosives are stored, nor store primers in a magazine.

13. Do not carry blasting caps in your clothing. Make a separate damp-proof container with padding to prevent sudden shocks.

14. Metal tools must never be used in handling or opening cases of explosives, because of the ever-present danger of striking a spark from the nails in the cases. Always use wooden wedges and mallets.

15. During freezing or subzero weather, explosives should be taken from storage magazines only in quantities that are needed to load the
(Continued on page 92)

Nathan L. Smith Appointed Chief Engineer of Baltimore

Nathan L. Smith, formerly chairman of the Maryland State Roads Commission, and later its chief engineer, has been appointed Chief Engineer of the city of Baltimore, Md., to succeed George Cobb, whose death is

noted elsewhere in this issue. Mr. Smith who is 55 years old, began his engineering career with the Baltimore and Ohio Railroad after he obtained his engineering degree at Swarthmore College. He entered the service of the State Roads Commission in February, 1912.

Mr. Smith was appointed principal assistant engineer of the Paving Commission on January 1, 1921, and became acting chief engineer in 1924. He served in the latter capacity until the commission was merged into the Department of Public Works in 1925.

In July of that year he became assistant highways engineer of Baltimore in charge of the design and construction of all improved paving. He left that post in 1927.

He was then appointed Highways Engineer of Baltimore.

He became associate to the Chief Engineer of Baltimore in 1931, remaining until 1935 when he was appointed chairman of the State Roads Commission and director of Public Works of Maryland. He resigned in 1935 to become chief engineer of the State Roads Commission, serving until October, 1939. The following year he entered private engineering practice as consultant engineer.

New Link of Pan-American Road Open

The Venezuelan link of the Pan-American Highway is reported to be open to traffic. About 180 miles of the road are paved with concrete and the remaining 600 miles have been hardened with natural materials. The work is expected to be completed within four years.

Costs for Soil-Cement Street Construction, Burlington, Vt.

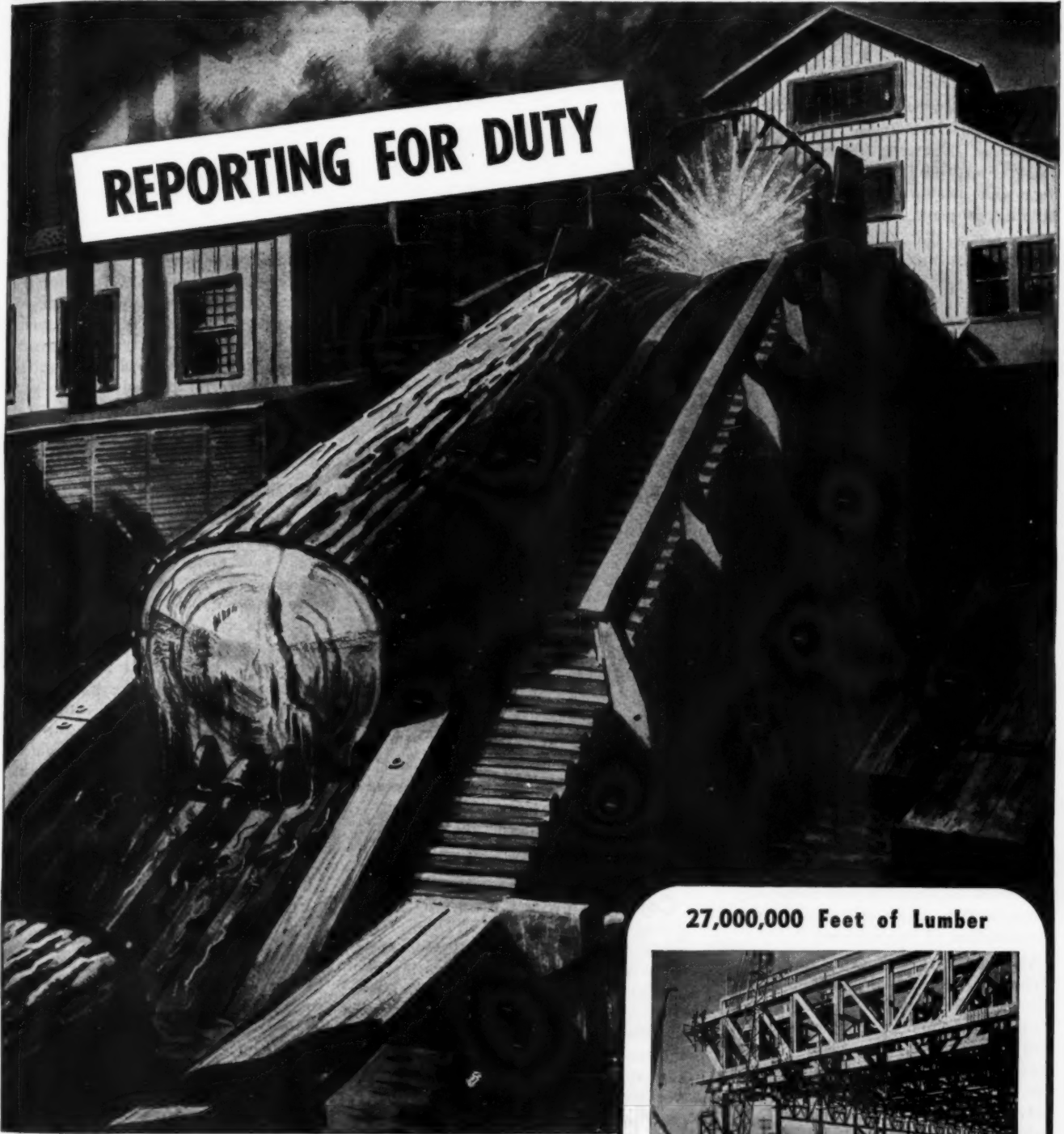
The following costs are of interest in connection with a 5,835 sq. yd. soil cement street job, completed in 3

working days along 2,000 ft. of distance. Equipment item consists of rental charge for equipment already on hand. The details of this job were published in June *ROADS AND STREETS*, pages 51-53.

Items of Work	Labor	Equipment	Materials	Totals	Unit Cost
Supervision	\$124.70	\$	\$	\$ 124.70	\$0.021
Grading and prepare base.....	27.29	191.18	.....	218.47	0.037
Fill	29.02	377.97	243.78	650.77	0.112
Unload and place cement.....	74.39	91.21	1,934.21	2,099.81	0.360
Mixing process	141.77	568.79	14.08	724.64	0.125
Cure and cover, inc. cleaning.....	98.23	199.40	7.49	305.12	0.051
Backfill and grade, borrow pit.....	.....	238.27	.....	238.27	0.041
Miscellaneous costs	35.51	25.53	76.66	137.70	0.024
Insurance .....	.....	.....	.....	11.19	0.002
	\$530.91	\$1,692.35	\$2,276.22	\$4,510.67	\$0.773
(Asphalt Emulsion Surface Mat)					
Penetration seal coat HRM.....	\$ 9.28	\$ 34.36	\$ 169.50	\$ 213.14	\$0.036
Miscellaneous .....	.....	.....	15.00	15.00	0.003
TOTAL COST (not including second treatment at cost of about 10 cents per sq. yd. in following spring)	\$540.19	\$1,726.71	\$2,460.72	\$4,738.81	\$0.513

FREEDOM IS NOT FREE~IT IS PRICELESS ★ BUY WAR BONDS

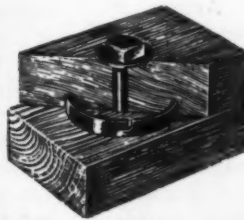
REPORTING FOR DUTY



27,000,000 Feet of Lumber



Giant, engineered timber trusses of the world's largest timber-built factory, designed by The Austin Company, of Chicago, engineers and builders.



The **TECO** Ring Connector spreads the load on a timber joint over practically the entire cross-section of the woods... brings the full structural strength of lumber into play.

Up from the log pond into the sawmill. Wood is contributing to victory on every fighting front. At home, lumber prefabricated under the TECO Connector System of timber engineering has replaced metal in thousands of heavy war structures such as the aircraft assembly plant shown above. Engineered timber is destined to play a leading role in the reconstruction era to come. You, also, can design in timber with TECO—for strength, durability, and economy. Write today for our literature.

TIMBER ENGINEERING COMPANY
NATIONAL MANUFACTURERS OF TECO TIMBER CONNECTORS AND TOOLS
WASHINGTON, D. C. PORTLAND, OREGON

WOOD GOES TO WAR — An MGM Technicolor short by James A. Fitzpatrick. Ask your theater when you can see it.

ROADS AND STREETS, July, 1943

Ohio Post-War Planning Conference

A conference was held June 24 at Columbus, O. under the auspices of the State Highway Department of Ohio for the purpose of coordinating state-wide post-war road and street building projects.

More than 900 county commissioners, township trustees, county engineers, city planning engineers, service directors and Chamber of Commerce secretaries attended the conference and approved a resolution proposed by Paul G. Shafer, Portage county engineer, favoring federal aid for immediate advanced highway planning.

Highway Director H. G. Sours set four goals for state-wide actions:

(1) Provide for unemployment after the war.

(2) Develop a long-range highway construction program to guard against a surplus of labor which would make improvised relief work unnecessary.

(3) Insure a maximum volume of work commensurate with available funds.

(4) Enable the building of long-deferred highway projects.

Director Sours stressed that "the conference was to discuss means and procedure for preparing today for after-the-war construction of useful public works, such as highways, so there will come a peacetime period free from depressions and temporary booms and so there will be a definite stabilization of our economy."

The speakers included Charles M. Upham, engineer-director of the American Road Builders Association; Paul V. Reinhold of Pittsburgh, first vice president of the ARBA; Theodore Matson, director of the Bureau for Street Traffic Research at Yale university, and Governor John W. Bricker of Ohio.

A quiz session was a part of the conference program. The panel was made up of Director Sours and Walter W. Graf, president, Ohio Society of Professional Engineers and city engineer of Lancaster; Arthur F. Ranney, Summit county engineer and president of the Ohio County Engineers association; Murray D. Shaffer, chief engineer of the highway department's bureau of location and design; Glenn R. Logue, the department's assistant director and chief engineer; C. H. Makeever, acting chief engineer of the department's planning survey,

and Harry E. Neal, chief engineer of the departments' division of traffic and safety.

Mr. Upham told the conference that a number of toll roads similar to the Pennsylvania Turnpike would be constructed throughout the nation after the war. They would be self-supporting, he said.

He also asserted that a "50 per cent increase in automobile traffic above the peak year recorded in the United States is anticipated after the war," and forecast that "the income from this source will go a long way toward paying for the construction of needed highway improvements."

The Department's after-the-war program, according to Mr. Shaffer, includes a \$70,000,000 federal aid schedule and a state system setup including 900 projects, many of which are located in and adjacent to villages and cities, to cost an estimated \$130,000,000.

The planning conference recessed after it was agreed that those present should set up committees in their home cities, villages and counties to work out programs for street and highway improvements, those plans to be submitted to the Department of Highways, there to be worked into the over-all state-wide construction schedule as needs dictated and funds were available.

Congress Passes Planning Bill

As we go to press, H. R. 2798 (formerly H. R. 2113, see *ROADS AND STREETS*, June, page 62) awaits the President's expected approval. The bill is substantially as approved by the Senate except for Section 9, rewritten to provide that "No part of any appropriation authorized in this Act shall be impounded or withheld from obligation or expenditure by anyone unless the War Production Board shall certify that the use of critical material for additional highway construction would impede the conduct of the war."

The bill now provides for (1) inclusion of rights-of-way costs as part of "construction"; (2) suspension of any reapportionment of federal-aid funds until one year after present emergency; (3) engineering and economic investigations and preparation of plans, specifications and estimates for postwar highway improvements not to exceed in any state an amount which would represent the state's

share of \$50,000,000 apportioned under regular federal-aid formula; (4) increasing the amount available for access roads to sources of raw material from \$10,000,000 to \$27,500,000; (5) for PRA to survey need of a system of express highways, with approximate routes and costs; (6) reimbursement to states and subdivisions for road damage by any government agency or contractor operating in prosecution of the war; (7) an additional \$10,000,000 for repair of road flood damage, etc.; (8) technical federal-aid law relating to freeing of toll bridges and extension of time for acquiring or reconstructing such bridges to January 1, 1945; and (9) funds shall not be withheld from obligation unless proposed construction requires critical material needed for the war effort.

Special Centerline Marking On N. C. Blackout Roads

Additional traffic lane marking service is being given on roads in the "no light zone" along the North Carolina coast according to B. W. Davis, state maintenance engineer. Traffic in this area is required to drive with parking lights, under which the ordinary white lane marking is hard to see especially if not recently painted. The standard 4-inch-wide continuous white line is given a reflecting element, consisting of glass beads placed continuously on curves and in 50-ft. strips alternating with 50-ft. paint strips on tangents. The service to the motorist is well worth the added expense.

50 Wisconsin Cities Making Post War Plans

At least fifty Wisconsin municipalities and nine counties are contemplating after-the-war construction programs according to a survey by "Western Builder." In about one-third of the cases, actual plans are in preparation or completed. (Madison's program, article in this issue). Milwaukee leads in size of program with a 6-year outline covering lake front and outer drive improvements, streets, alleys, sewers, bridges and other projects which will total \$3,540,000 the first year.

Founder of Burma Road to Visit U. S.

Y. T. Miao, one of the principal founders of the Burma road and a powerful figure in the politics of Yunnan Province, will visit the United States to study industrial and financial control.

**Care and Repair
in Shop and Field**

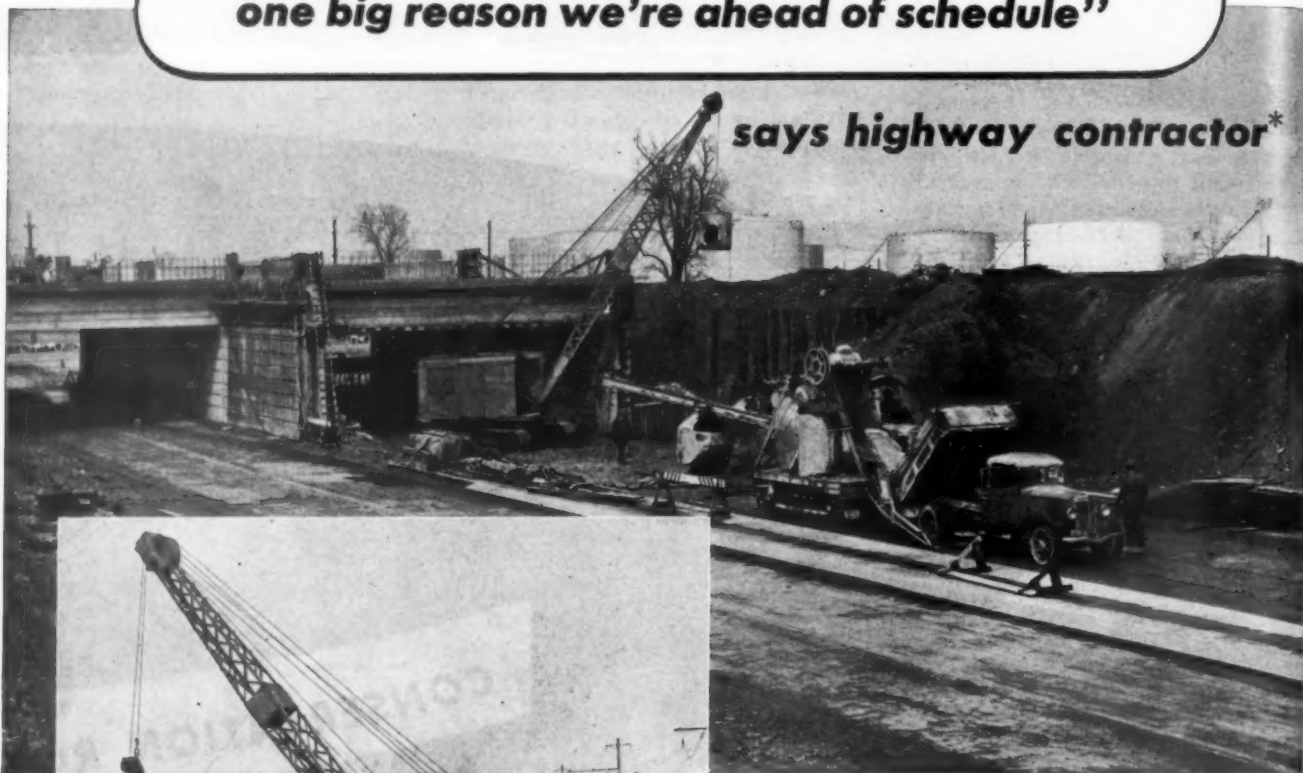
CONSERVATION ROAD

CONSTRUCTION EQUIPMENT MAINTENANCE

A SPECIAL SECTION OF ROADS & STREETS

**"With Gulf Lubricants
we steer clear of mechanical delays—
one big reason we're ahead of schedule"**

says highway contractor*



*Acchione Contracting Co., Philadelphia, Pa. is engaged in constructing an important road in the Philadelphia industrial area. This job involves grading, paving, and building a new railroad bridge without stoppage of railroad traffic. With Gulf lubricants and fuels, this contractor is ahead of a tough schedule.

**Call in a Gulf Service Engineer before you start your next job—he can help
you get extra hours of trouble-free service from your equipment.**

"With new equipment and spare parts hard to get, more than ever we rely on proper lubrication with Gulf oils and greases," says highway contractor.* "Gulf lubricants provide the kind of protection that heads off mechanical troubles and keeps our equipment on the job—one big reason we're ahead of a tough schedule."

The progress and profit on any construction job depend to a large extent on the efficiency of the equipment that does the work. That is why many leading contractors have adopted Gulf Lubrication as a standard part

of their operating practice—they know from experience that they get full capacity performance and extra hours of trouble-free service from every unit.

Call in a Gulf Service Engineer before you start your next job—let him demonstrate the *higher protection value* of Gulf Quality Lubricants. He will show you how you can get more efficient lubrication of your equipment at no additional cost! Write or 'phone your nearest Gulf office today.



GULF OIL CORPORATION • GULF REFINING COMPANY • PITTSBURGH, PA.

ROADS AND STREETS, July, 1943

Equipment Maintenance

Keeping Up Cincinnati's Fleet

Modern departmentalized shop pays dividends; notes on repair and salvage methods

By HAROLD J. McKEEVER

Associate Editor, Roads & Streets

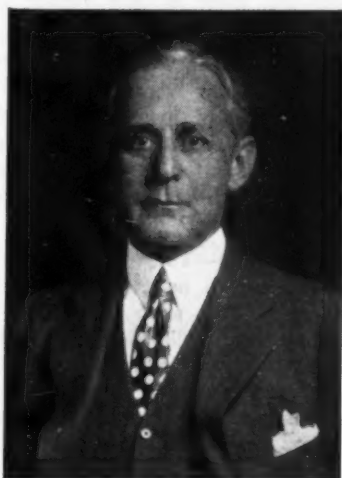
PROBABLY not one Cincinnati citizen in a hundred would be aware of his city's big modern municipal equipment shop, except for the fact that twice a year he must drive his car or truck over the safety test-lanes housed under the same roof. Even with this close brush, he probably has no inkling of the large-scale, highly-mechanized repairing and overhauling of city equipment that goes on in the next rooms. Nor that the pretty women inspectors who put his car through the jumps also double as trained mechanic assistants during less busy test-lane periods.

Nor, for that matter, that the city has to keep up a fleet of fourteen hundred trucks and other equipment in order to maintain its streets and other physical properties and services. As a city nationally famed for its good municipal management, you'd expect to find here an equipment maintenance organization that is on its toes. You will. They've had their share of labor worries, but enough key men have stayed on the job to enable this section to keep abreast of its job. While an exceptionally good stock of parts and equipment was on hand when war came along, it has been necessary to do a large amount of salvage work and extraordinary repairs.

Of the city's 1400 mechanical equipment units, about 400 are operated by the equipment section of the Division of Highway Maintenance, for use in street, bridge and sewer repairs, street cleaning, winter patrol, snow removal and maintenance of traffic lights other than stop lights. Under the present organization, all city-owned equipment, including that of the fire, police, and other functions as well as street maintenance, is repaired by the Municipal Repair Shop section of the Municipal Garage, which is directly under the Department of Public Works.

Repair Shop Departmentalized

The main part of the 70,000 sq. ft. of shop floor space is of course given over to truck repair. Aided by the special services touched on below, the line mechanics use latest bench equipment to carry each job through in



C. O. Sherrill

City Manager of Cincinnati

usual "job ticket" routine. Coming into the picture also may be any or all of the following:

Upholstery Room—Here cushions, curtains and other related items are refurbished, or even rebuilt. As a by-product of this work, large quantities of brackets, screws, handles and other door hardware are salvaged and stored in convenient racks. All usable windshield and window glass from wrecks is also saved.

Ignition Room—An average of three generators or starters daily pass through here the year around. Many are complete overhauls, especially today. This department takes the opportunity to inspect and repair many units from the various machines that come into the shop for other reasons. The usual routine includes the following items:

Tear down generator or starter and clean.

Check tension of brush spring.

Test armatures on a growler for shorts.

Re-solder leads into commutator if it shows signs of being loose.

True up commutator if under-cut.

Check field coils.

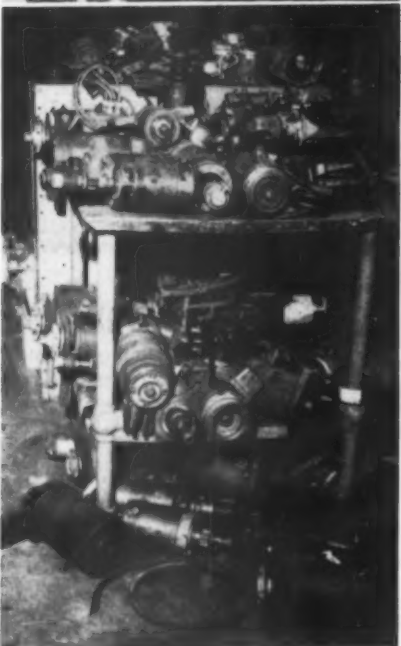
Broken parts seldom figure in this work. But the above operations are covered as routine, using standard tolerances and following manufacturers' instructions with care. The overhauled unit then goes to the test bench.

Every starter is tested for pulling capacity with a torque arm, to make certain that no unit goes back in service with a tight bearing or other defect that would result in pulling a battery down.

The most common problem is the generator which comes in with worn brushes, as a result of which solder is burned off and melted solder thrown out of the commutator by centrifugal force. Armatures are resoldered and turned down on a small lathe.

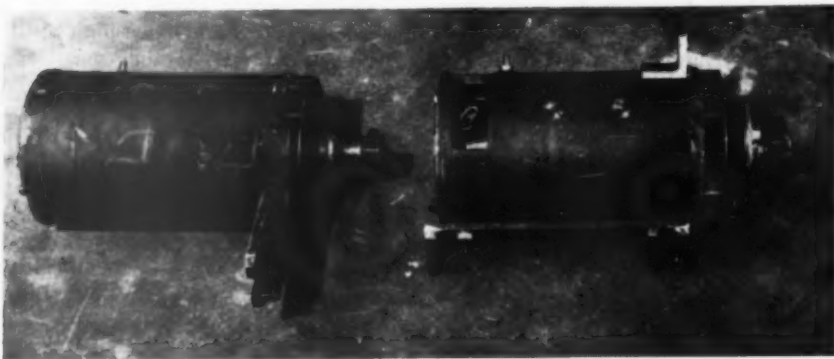
Young women perform most of the work in this department, dividing their time between here and the safety test-lanes in an adjoining room. Experience has shown that girls of average ability can be developed into competent helpers in three weeks, and that women in general have high aptitude for the handling and repairing of generators, and other units involving small, intricate parts.

Air Brake Test Bench—Since most trucks have air brakes, upkeep of this equipment is a big-volume operation in a large city's fleet. At Cincinnati an air-brake specialist puts in full time at this job. He has sidestepped the acute shortage of air-brake replacement parts by salvaging worn parts to the limit, even at extra cost. Broken-off brake chambers are common, and many application valves



The pile of generators down on the floor is awaiting check-up or overhaul; those on the table are ready to go. Many are from machines in the shop primarily for other repairs. The policy is to keep one spare unit on hand for each ten units in service

Above: Cincinnati has eased its mechanic shortage by training women for the finer work, such as electrical and carburetor repairs. This girl is performing war-emergency repairs on an armature shaft by cutting it down, shrinking on a sleeve and re-keying



These two heavy-duty Ford generators were once identical. One now fits a Chevy

have had to be re-ground. Hose connections are a daily problem, and large sections of hose are saved and cut down for use where shorter pieces will suffice. A lot of metal fittings, including quite small and intricate units, are made in the machine shop.

Other air-brake parts needing constant attention: relay emergency applications, relay valves, governors, pressure regulators, safety valves, drain cocks—each imposing special machine shop problems.

Best Mechanics in the Grease Pits

Greasing Room—Two-level or pit operation is employed rather than hydraulic lifts, as a means of handling a large number of units rapidly in the quarters allowed for the work. Good mechanics are assigned to greasing. This pays, since the fellows locate incipient trouble and thus help eliminate costly road calls. They especially watch battery terminals. For each machine serviced, a duplicate record sheet goes to the proper department notifying them of any repair work needed.

Battery Rebuilding—Batteries are practically new when they leave this room. Stock plates, vents and covers are used to replace rusted-out parts. The city buys the best quality plates, a policy which has been molded in the shop in batches.

Tire Shop—The war caught this department in need of a power rim remover. The shop mechanics are rigging up a home-made machine which will incorporate a hydraulic jack made from an old scarifier air-lift, and other parts made from scrap metal. The motor, pump and oil tank are taken from an old hydraulic lift.

Machine Shop—Supplementing a well-equipped machine shop located upstairs, is an auxiliary group of units located in one corner of the main truck repair room. This group serves several functions. It saves time, since the machine shop proper is on a higher level, and men can walk quick-

ly over to these machines. But more important, it keeps men who are not machine-shop specialists off the heavy duty machines and units used for more careful work. This little group includes a grinder, arbor press, two drill presses, a brake drum truing machine.

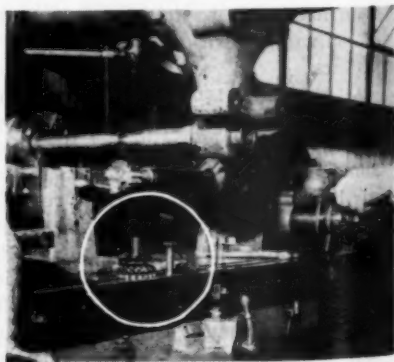
Automatically Controlled Forging and Annealing Equipment

Forge Room—While perhaps few cities or highway departments will be justified as having as complete equipment, the layout of the forge room is nevertheless of interest. In addition to the usual open forge, there is an annealing furnace, a heat-treating salt bath and a forging machine for small parts, all hooked up with a pyrometer for accurate, automatic temperature control. The special purpose of these units is to manufacture or repair the large number of air-drill bits and other pneumatic tools used by the city in pavement breaking, repairing, etc.

Lately the forging machine has been used to reshape clam and dipper teeth and other parts after welding up with manganese rod. The increased hardness due to forging, as well as the smooth, true shape of the repaired teeth, results in longer and more efficient service.

Salvage Stock Room—In addition to a modern, highly systematized factory stock room there is a separate caged room with orderly racks for all manner of salvaged parts and units, mostly taken from wrecks or dismantled machines. When a city-owned machine is damaged beyond economic repair through accident, all valuable parts are retrieved—a long standing policy that has done much to relieve the current parts situation.

Heavy-unit Repairs—One high-ceiling bay, equipped with heavy-duty overhead traveling crane, is given over to the repairing of trac-



The Cincinnati shop men make their quota of machine tool parts. Being cut here are the precision teeth of a milling cutter. Other cutters, made from old high-alloy axle shafting are also shown (see circle)

tors, rollers, and other heavy or special equipment. Salvage is the watchword in this department. A few examples will be noted in a moment.

Other Departments—This huge shop building also houses a radio repair room, for police car equipment; a carburetor bench (located in the ignition room and also "manned" by women today); a body shop, for fender and body straightening, etc.; broom shop; paint shop; motorcycle department; and a bench for overhauling weed mowers.

Typical Overhaul and Repair Jobs

As usual with any large operation, the most interesting repair jobs have always "gone out," and the details are lost to the memory of the men who devised the repairs (or else hidden by grease and mud). While most of Cincinnati's overhauling is done in winter, a few notable jobs were on the floor in April.

One of these concerned a "Big Sandy" sand spreader whose roller bearings had worn out. This machine got quite a going over, all told, including these items:

1. To get along without new roller bearing units (practically unobtainable), the stub shaft at each wheel was machined down, a new sleeve bearing was made by machining a cast iron bushing to fit the space formerly occupied by the bearing, and then an inner bronze bushing was inserted to fit the shaft.

2. Worn elbow bearings of operating lever arms—28 holes in all—were welded and machined for more accurate operation.

3. Brake arms were tightened up in a similar manner.

4. A cracked motor block was salvaged by covering the crack with a 1/16-in. steel plate, held by bolts tapped into the casting. The edge

of the plate was strengthened by a 1/8-in. steel reinforcing rim under the bolts. Bolts were spaced one inch apart. A boss was made for the water manifold, which was braised to the steel plate.

5. Old tires were replaced by swapping them for less-worn tires picked up from a second-hand dealer.

Pinion Gear Teeth Welded and Ground without Removal

When the pinion gear teeth of a Buffalo-Springfield roller became worn, a welding and grinding job was done without taking out the gear. It involved hoisting the front end of the roller three feet in the air with the overhead crane, and a long stretch of work with the welder and grinder operator lying flat on their backs on the floor. A perfect job, and a valuable part salvaged.

The front roller of this machine, which had become badly worn, was replaced by burning off the spokes and welding on a new fellon band (rim and flange) from another roller wheel which happened to have the same diameter but a different type hub.

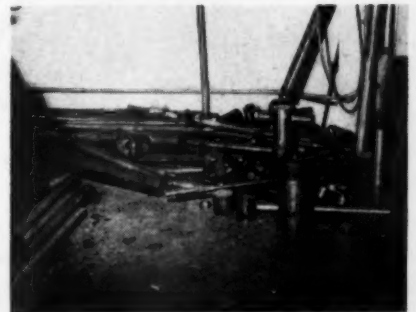
In another case involving a different roller, the Cincinnati shop men stopped progressive warping and failure and strengthened a front wheel by welding a reinforcing web around inside. This is a salvage detail of wide application.

Repairing Broom Conveyor Roller

The spiral strips on a street-broom shaft were welded on, using half-round stock metal after burning off the worn strips. This repair detail is repeated every two years on the average. Complete rollers have been made in the shop when unobtainable at the factory.



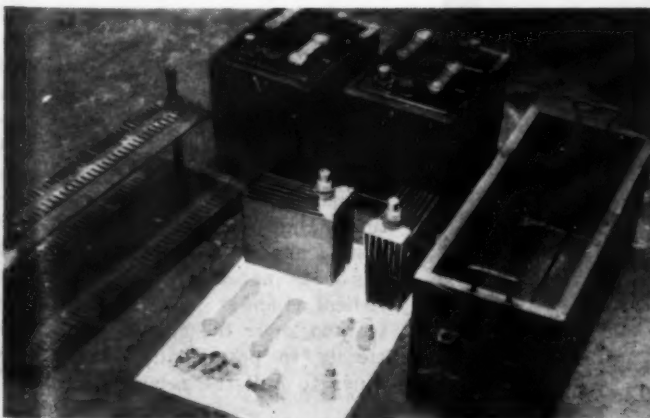
At left is a Sullivan annealing oven used in the manufacture of small pneumatic tools, and on the rack is a pile of freshly manufactured drill bits



Worth its weight in gold: high alloy metal scrap pile in the machine shop corner



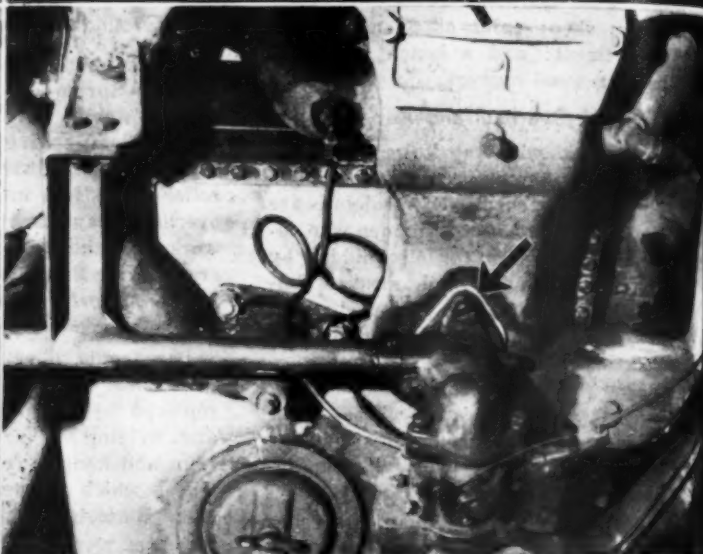
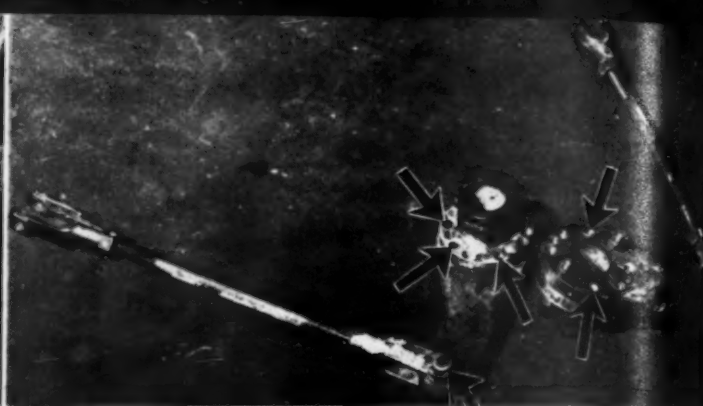
Arrow shows an offset or oversize shaft section, built up by welding and machining to fit a worn bearing for a bulldozer fulcrum arm



The small battery parts on white paper were cast in the Cincinnati shop as part of its battery re-building routine. Using new factory plates, plate gangs are then made up using spacing frame at left. Shown are two rebuilt batteries and a new shop-made wooden battery case developed as a war economy



Air brake test bench, with an application valve undergoing check-over



Repairing a "Big Sandy" Sand Spreader

SHUTTER AND OPERATING LEVERS (upper left)—all pin connections tightened up by welding and reboring holes—28 in all (at arrows, etc.)

WHEEL BEARINGS (lower left)—worn Hyatt roller bearings (one is shown here) were replaced by manufacturing a 5/8-in. diameter x 5-in.-long iron bushing (A) and inserting a bronze bushing (B) within it to fit the worn shaft

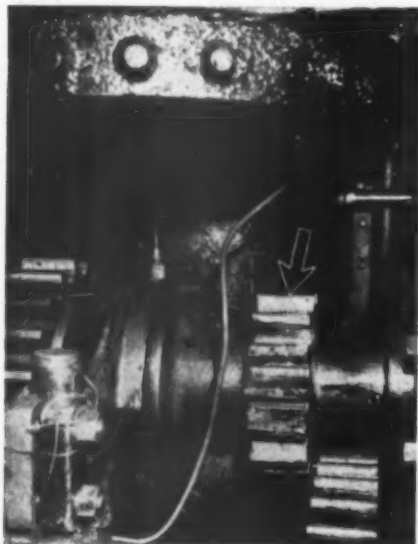
BRAKE ARMS (upper right)—all elongated, worn holes were acetylene bronze-welded and rebored (again, see arrows)

BROKEN WATER jacket on McCormick-Deering engine (lower right)—repaired by covering with a steel plate, held down by screws tapped into the casting. (See broken line.) Also note the braised water jacket connection (arrow).

Cincinnati Personnel

The municipal garage is under J. E. Root, director of public works. Anthony Sauer is garage superintendent, Joe Maurer is asst. supt., and O. Buch-

holz, supervisor. Storage and operation of street equipment are under C. E. Brokaw, superintendent of highway maintenance, with Wilburn E. Meyer supervisor of equipment. H. H. Kranz is city engineer and C. O. Sherrill city manager of Cincinnati.



Undershot view of Buffalo-Springfield roller gear teeth, which were welded and ground from lying position without removal of the pinion shaft



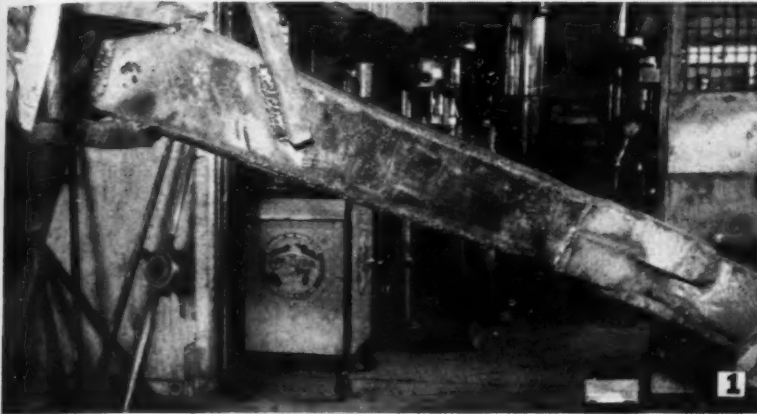
Clamshell teeth as built up by welding and reshaped, toughened and hardened in the municipal forging and annealing room. Note perfect "new" shape and surface quality

Overcoming High Back Pressures in Diesel Generator Sets

In a recent address before the American Society of Mechanical Engineers, Ralph L. Boyer, Chief engineer of The Cooper-Bessemer Corporation, reminded of the importance of a well designed exhaust system in the installation and maintenance of diesel auxiliary generator sets.

"A common and easily explained practice, he said, is to pay too little attention to where the auxiliary engines may be placed, with the result that the exhaust line is frequently extremely long and of a tortuous nature. High back pressures usually result, and in a number of cases it has been necessary to make rather radical changes in the exhaust system, to lower the back pressure sufficiently to permit the auxiliary engines to pull the required overload."

The New Jersey state highway commission has been delegated War Department agent on the construction of four access links at Government reservations in Monmouth County.



Scraper Meets Stump

How Dane County, Wisconsin,
Repaired an 8-yr. LeTourneau

THIS six-year-old scraper was indeed a wreck. The "other fellow" in the encounter being a hidden stump. During the late winter the Dane County, Wis., shop men, under foreman George Bouin, put it in good condition again by means of the following repairs, made in accordance with manufacturer's recommendations.

The right arm of the yoke, which had been torn clear in two, was rebuilt by welding pieces of ½-in. steel plate into a box design matching the original arm. The new part was then welded into position after cutting away the old twisted arm, and the job completed by welding new front bracing (Photos 1 and 2).

Worn front and rear wheel spindles were built up with welding metal and machined down (Photos 3 and 4). One had a ½-in. cut in the bearing surface, and ordinarily would have been discarded.

A new shop-manufactured pin

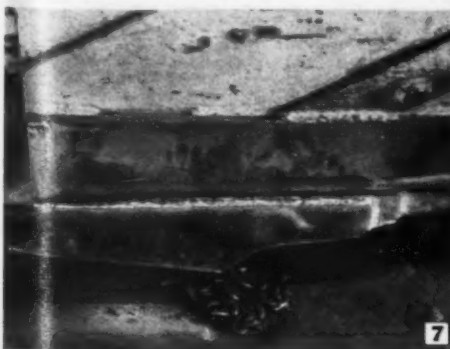
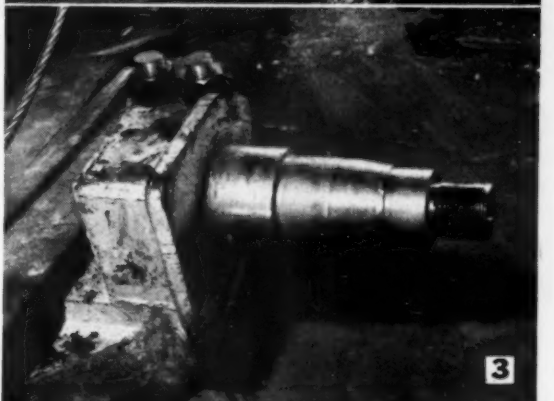
was put in right side of apron. It was made by turning a round pin shank on the lathe and welding on the head flange. (Photo 5).

A new sheave pin for the bottom sheave was made to accurate dimension required to fit the roller bearing. (Photo No. 6) shows two of these pins, one of which is fitted into its roller bearing, ready to set into the original sheave; a new shop-made sheave pin bolt; bronze bushings, also turned in the shop; and a cone used in connection with these machining operations.

New runner plates were welded at either side of the cutting blade (Photo 7).

Not shown, is a piece of steel welded on the under side of the cutting edge to reinforce it against further wear.

The top and front corners of the scraper frame (not shown) were also welded to help restore original rigidity and strength.



Care of Rock Drills



ALTHOUGH difficult to believe, a rock drill despite its battering service, is built with the same precision as a fine watch. Some parts must be machined to within 0.0005" less than one-sixth paper thickness. In addition, the drill must be extremely durable and sturdy. The piston, for example, strikes 1800 to 2200 hard blows a minute against a drill steel shank. To build against such punishment special attention is devoted to materials, machining, and heat-treatment. The average drifter piston requires 55 hours to make; yet despite this care it can be spalled or broken through careless, improper operation.

A new air hammer or drill should be delivered with a coating of oil or grease on all working surfaces; but when placed in service, its oil reservoirs must be filled with the proper type of lubricant.

Before the air hose is attached to the drill or hammer, it should be blown free of any dirt or other particles that may clog the tool and cause serious damage. The air in the line should be free of moisture, which is most damaging to air tools because it washes away the lubricant, may

freeze the valves and ports, and is harmful in other ways. Intercoolers, aftercoolers, and water traps all contribute to drying the air.

Proper Drilling Methods

The user should be instructed in the fundamentals of good rock drill operation. One of these fundamentals is the proper method of handling the drill. The instructor should emphasize that the machine must be kept in line with the drill steel. Otherwise chuck bushings wear rapidly; and

when this occurs the piston strikes the corner of the drill steel, and spalling results.

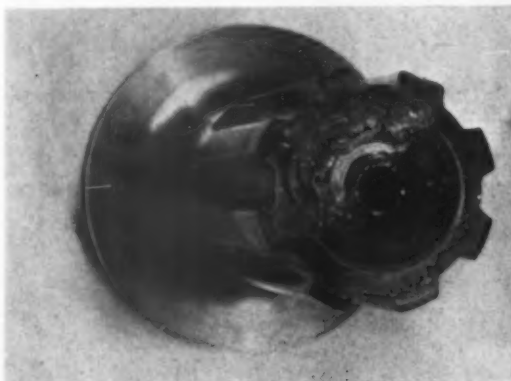
Holes drilled by dry hand-held sinkers should be blown frequently to keep the bit from binding. When drilling in moist ground, a wet machine should be used. The water flowing through the drill steel will prevent plugging of the bit and will also prevent "mud collar", which often sticks the steel.

Failure to keep the bit properly sharpened is a frequent cause of bit breakage. Dullness, in addition to lowering drilling efficiency, puts undue strain upon the wings of the bit.

Drill shanks that are too long or too short should be avoided. Drilling speed is reduced when the shank is too short, because the piston does not strike with full force. Long shanks tend to short-stroke the machine, again reducing the power of the blow. Follow manufacturer's instructions.

Avoid Worn Front Washer

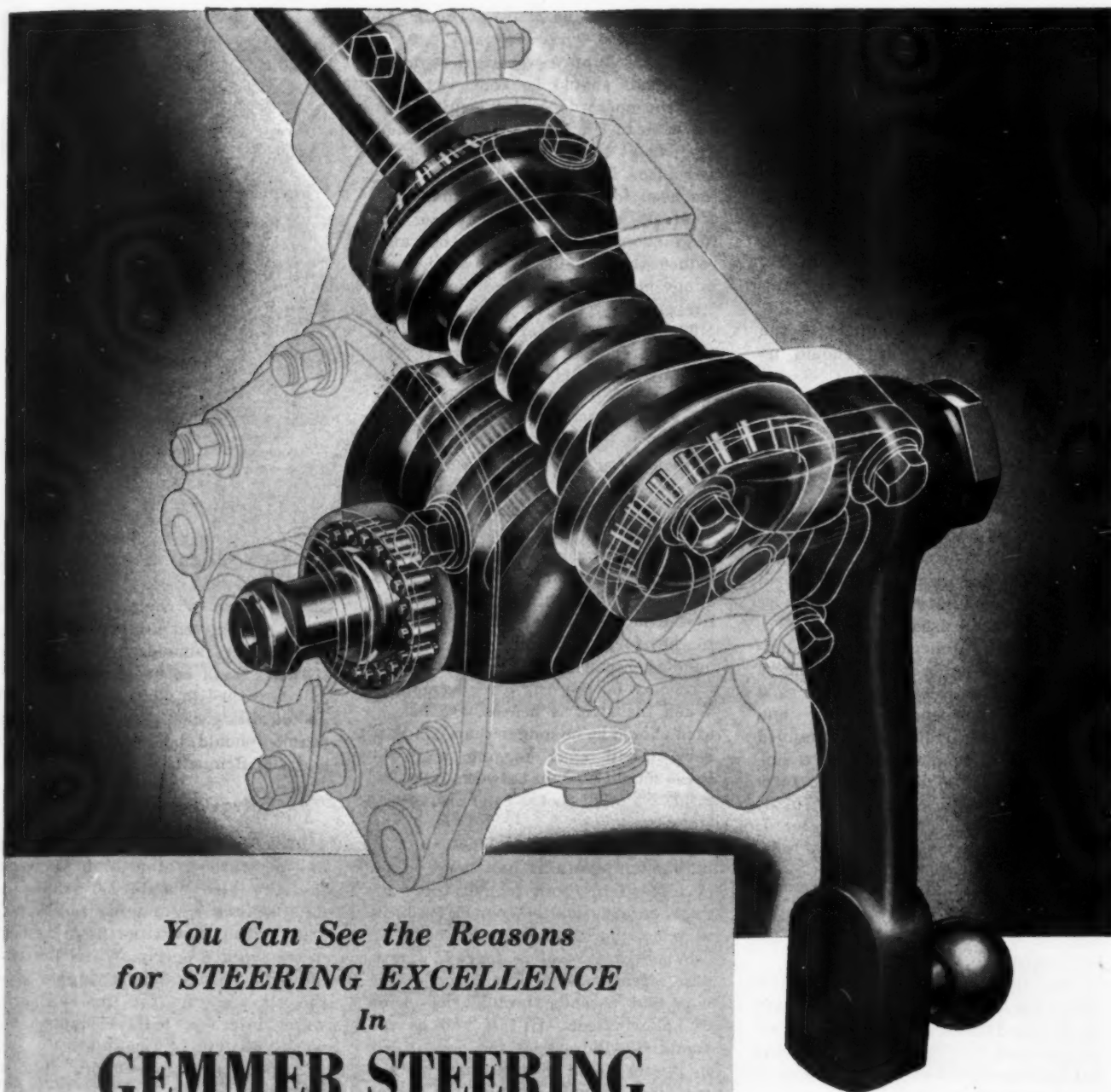
The cylinder front washer should never be permitted to become excessively worn; this will destroy the cushion at the front end and cause breakage of fronthead parts and pis-



Piston spalled on striking face. Do not use shanks that are not properly ground square



Photos courtesy Compressed Air Institute.
Drill shanks that are too long or too short should be avoided



*You Can See the Reasons
for STEERING EXCELLENCE
In
GEMMER STEERING*

This phantom view of the Gemmer Steering Gear shows clearly the reasons for steering excellence.

THE BASIC DESIGN—an hour-glass worm engaging *teeth that roll*—provides highest efficiency—easiest transference of power. No sliding contact between teeth.

ANTIFRICTION BEARINGS at all critical points—particularly important to efficiency where motion is relatively slow.

STURDY—COMPACT—The close coupled design provides exceptional compactness—ease of installation—saving of weight without sacrifice of overall capacity or steering arm

angularity. Solid steel forgings provide abundant strength, durability—ample safety factor—internal stresses are low.

SIMPLICITY—just a few parts—nothing complex—nothing to get out of order or require frequent adjustment.

STABILITY—Inherent design banishes "lost motion" and reduces wear to the least possible minimum. Steering is always firm, response positive with absence of rubbery feeling and wander.

Gemmer Steering is demonstrating its worth in every type of automotive vehicle from the lightest

passenger cars to the heaviest buses and trucks—in the road-building machinery, agricultural tractor and marine fields.

*Gemmer—Pioneer of
High Efficiency Steering*

**GEMMER
MANUFACTURING
COMPANY**

6100 MT. ELLIOTT AVE.
DETROIT, MICH.

ROADS AND STREETS, July, 1943

tons. Neither should chuck bushings in the drill be permitted to wear unduly, for this will prevent the piston from striking its blows squarely on the shank of the drill steel—which in turn will cause the piston to spall or fracture. The chuck bushings may wear out prematurely if the diameter of the drill-steel shanks is too small or if the machine is not in line with the drilled hole. The end of the shank should be ground square so as to distribute the force of the blows evenly over its surface.

In short, any working part in the drill that becomes worn should be given attention immediately.

Notes on Lubrication

Much scoring can be prevented by lubrication. A lubricator in the air line is recommended and can be easily and quickly installed. It feeds oil into the air line by means of an adjustable needle valve. The atomized lubricant from this important accessory will flow at a temperature determined by the grade of oil used.

Oil used in sinkers, stoppers, drifters and paving breakers, should be well refined petroleum oil, clear and free from suspended matter and water; or shall be a well refined petroleum oil compounded with a sufficient quantity of animal oil to form a satisfactory lubricant for rock drills where water or wet air is encountered; or should be a good grade of free flowing liquid grease which will not separate upon standing.

Castor Machine (Aluminum Soap) oils, or oils containing graphite, are not approved.

The following physical properties are representative of oils which have been found satisfactory under actual commercial service in the field, and all oils purchased to this specification shall conform to these requirements:

Flash Point (Open Cup)...	350° F.	Min.
Vis. at 100-F (Saybolt { 450 Sec. Min.		
Universal)	700 Sec. Max.	
Vis. at 100-F (Redwood)...	330 Sec. Min.	
	600 Sec. Max.	
Vis. at 100-F (Engler)....	12.4°	Min.
	19.0°	Max.
Pour Point	15° F.	Max.
Mineral Acid Neutraliza-		
tion Number .....	.10	Max.
Free Fatty Acid (% Oleic)	.40	Max.
Steam Emulsion Number	300	Min.

Viscosity cannot always be determined on liquid greases and in this event the lubricant shall be free flowing and shall conform to the above specifications except for viscosity.

All tests shall be made according to A.S.T.M. Standard Methods.

Bit Maintenance

Drill steel for rock drills should be of the type that will withstand repeated forgings and poundings. An ample supply of sharpened steel

should always be kept on hand to prevent any work stoppage due to inadequate supply. When in storage, drill steels should be kept sorted so that the operator or blacksmith does not have to rummage through an odd assortment to obtain the proper type and size. Detachable bits eliminate the need for hauling large quantities of steel back and forth between the forge shop and the job, and they also reduce the amount of steel tied up in one place. Most sizes of detachable bits may be reground several times.

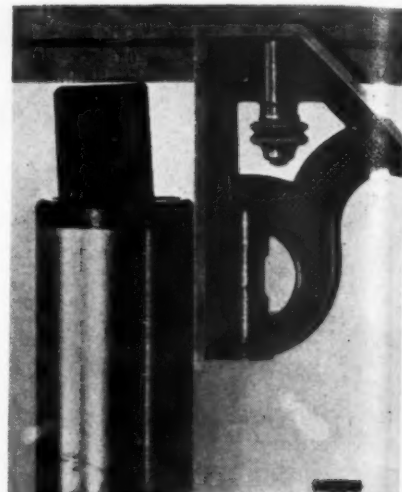
The shank ends of the drill steel and the ends of the pistons in the rock drills should be ground square; however, it is wise not to grind too much steel off the piston, because there is danger of exposing the soft core of the metal. Shank forging time can be reduced by use of drill steel sharpeners, which accurately form the hot metal into proper shape.

When forging a bit, the blacksmith must not only shape it with utmost care but must pay careful attention to the heat treatment. The bar steel to be forged should be carefully handled, because any nick on the surface may be the origin of a fracture. When the steel is heated, the heated area should be no longer than is necessary. (Drill steel forging temperatures should be kept between 1900 and 2100° F., with metal color orange to lemon yellow.)

Steel should not be kept at the higher temperatures any longer than necessary; for high temperatures induce decarburization, which reduces wearing and cutting qualities.

When drill steel is forged, particular attention should be given to the hole that extends through the inside of hollow steels. If this hole is too small, it will restrict the flow of air or water; and in the case of wet machines it will damage the water tubes.

Bits are hardened by heating to 1,450° F. The bit end should be sub-



Worn chuck bushings cause play in drill shank
Photo courtesy Compressed Air Institute.

merged in running water or brine to a depth of $\frac{1}{4}$ -inch and when the color fades completely, the entire heated end of the bar should be submerged and allowed to cool. If the ground water in a given locality is alkaline, rain water should be used. Drill shanks should be heated to 1,550° F. and quenched in quenching oil, which should be circulating. Hardness of shanks should be kept between 350 and 400 Brinnell.

Regulate Air Pressure

Rock drill parts will break if the air pressure is too high. Low air pressure also should be avoided as it is especially damaging to stopping drills, since it will not hold them up to the work properly. Water pressure in drills should not be higher than the air pressure, for this will drive water into the drill mechanism and wash away the lubricant.

Inspect at frequent and regular intervals!

If these instructions are judiciously followed, a definite contribution will be made to war production.

All Work and No Oil Makes Jackhammer a Dull Boy

THIS garbled version of a familiar saying expresses the general idea contained in air-tool maintenance instructions published by Gardner-Denver Company, Quincy, Ill. The following excerpts from this firm's booklet, "Care and Operation of Hand Held Drills", supplement the Compressed Air Institute's foregoing article.

Use Right Oil Grade. The oil used must withstand low temperatures—often below freezing—caused by sud-

den expansion of the operating air. And it must be of right consistency to flow to all moving parts of the drill. Upkeep costs on drills are increased by the use of oil of improper SAE rating for the operating temperature. The table below may be used as a guide:

Operating Temperature Range	Recommended S.A.E. Viscosity
Below 20° F.	S.A.E. 10 or lighter
20° to 40° F.	S.A.E. 20
40° to 80° F.	S.A.E. 30
80° to 110° F.	S.A.E. 40
Above 110° F.	S.A.E. 50

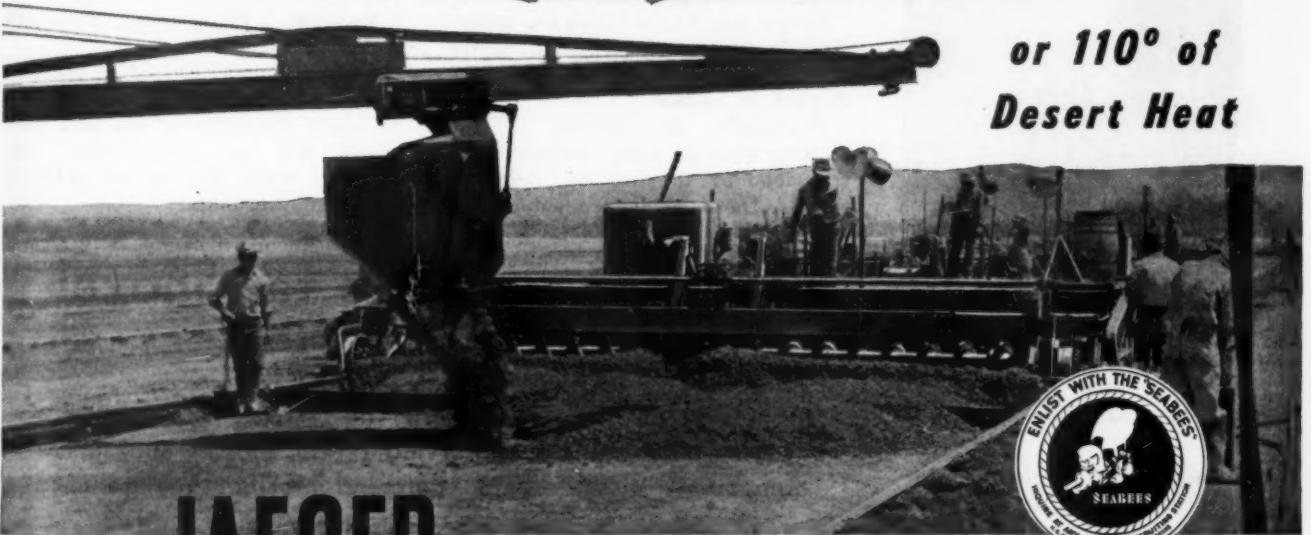
Mechanized Paving { Originated by JAEGER-LAKEWOOD }

Speeds YEAR'ROUND Airport Building

*Whether It's 7° Above Zero
(9° Below at Night),*



*or 110° of
Desert Heat*



THIS JAEGER TEAM CAN TAKE IT!

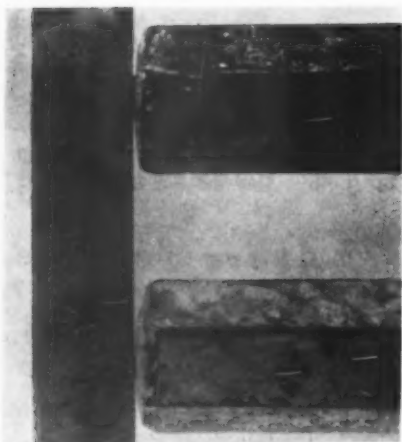


The Finishing Machine (originated by Jaeger-Lakewood in 1917) and the Concrete Spreader (originated by Jaeger in 1931), teamed with the modern paver, have made possible today's year 'round paving of vitally-needed airports, made possible today's high production*, made practicable the handling of today's dry mixes without segregation and with a minimum of manpower. By finishing millions of sq. yds. of slab in sub-freezing temperatures and, on some jobs, maintaining constant 24-hours-a-day operation over many months, these machines have further demonstrated why contractors depend on Jaeger-engineered equipment to meet their severest schedules and deliver a satisfactory and profitable finished job.

*Over 275 linear ft. per hour in 25 ft. width, over 475 linear ft. in 10 ft. width of denser, stronger, smoother slab.

THE JAEGER MACHINE CO.
223 Dublin Ave. Columbus, Ohio
Mixers, Pumps, Hoists, Paving Equipment

ROADS AND STREETS, July, 1943



These are improperly ground shank ends. They should be ground square



This drill shank has been burned. Temperatures that are too high should be avoided when forging drill steel

Photos courtesy Compressed Air Institute.

An indication of sufficient lubrication is the appearance of oil on the shank of the drill steel, and at the exhaust of the drill.

Line and Hose Reminders. Supply pipe lines should be of ample size and free from restrictions. Be sure that the valve from supply line to hose feeding the drill is fully open. Hose should be of good quality and condition, not less than $\frac{3}{4}$ " inside diameter for hand-held drills, and constructed with an oil-resisting inner tube.

Keep all pipe lines and hose connections free from leaks, as even small leaks cause expensive loss of compressed air and may cause enough loss to lessen the efficiency of the drill.

Pointers On Operation. In drilling do not allow the machine to bounce, but on the other hand do not ride it hard enough to slow the rotation. There is a point of correct holding pressure between these two extremes

at which the operation is most effective, recognized by the even sound of the exhaust and the free rotation of the drill steel.

When blowing the hole, relieve the pressure on the holding handles so that the air may reach the bottom of the hole. With the cuttings removed by blowing, the drill bit will then be drilling rock and not churning cuttings.

Keep the drill lined up with the steel and the steel free from chafing on the sides of the hole. This will increase drilling speed.

A stuck steel resulting from a mud collar may be prevented by pouring a little water into the hole. If the steel is stuck so tightly as to stop rotation, it is best to remove the drill and loosen the steel with a wrench.

Drill Steel Shanks and Bits. For most effective operation of the drills under discussion, the drill steel should be provided in two-foot changes.

See that the hole in the drill steel is of full size and is not closed up at either the shank or bit end.

Do not use shanks which are under-size, tapered, with ends not square and flat, or which have become chipped or spalled.

Practically all failures in the striking ends of piston hammers are traceable to the use of defective shanks, those which are chipped or

spalled being the most damaging.

Do not run a bit after the gauge is gone. To do so slows up drilling progress and throws undue strain on the working parts of the drill as well as on the drill steel. This promotes breakage of both. For the same reasons do not use dull drill steel.

Upkeep of the Drill. Keep the drill clean by wiping with waste or blowing dirt off with the air hose. By so doing there will be less chance of dirt getting into the drill to injure the working parts.

See that all nuts and connections are kept tight and particularly do not allow the side rod nuts to become loose. If they do the side rods are liable to break and the operation of the drill will be affected due to leakage of air at the joints.

A weak rotation of the steel may be due to weak or broken pawl springs, pawls with rounded edges, or worn rifle nut or rifle bar. After long service the teeth of the ratchet ring may become rounded enough to allow a slippage of the pawls and this will also retard and weaken rotation.

Renewal of the necessary parts will correct the trouble.

The steel puller should be replaced when it has become so worn as not to retain the collar of the drill steel shank, and the steel puller yoke bumpers when they do not hold the yoke firmly in place.

Maintenance Tips for Shovel Operators

At no period in our industrial history has there been a greater necessity for conserving power shovels and similar equipment through constant care and intelligent maintenance

By GEO. E. MILLER

Chief Engineer, Buckeye Traction Ditcher Company, Findlay, Ohio

THE following paragraphs touch on some of the timely points covered in manuals on operation and maintenance we are preparing on our shovel for the Corps of Engineers. I cannot impress upon all owners too strongly that careful attention to minor and often overlooked service operations will materially lengthen the life of your unit.

Fewer Oil and Grease Types

Realizing that the many grades and classes of lubricants required reduction and simplification, the War Department after much study and testing has set up a modified lubrication program calling for three oils, five greases and two gear-lubricants which it is believed will suffice for the needs

of all heavy machinery and permit uniformity of manufacture by the different refiners.

Broken down, these army specifications call for three general purpose greases, a water-pump grease and a wheel bearing grease, two gear lubricants, SAE 90 and SAE 80, and three engine oils, SAE 10, SAE 30 and SAE 50. Although some deviation from this list was formerly deemed advisable for the most efficient performance of some particular machine, it appears to be the consensus of opinion among most purveyors of equipment of the power shovel type that the kinds of lubricants enumerated will be adequate for almost all normal lubricating purposes. I believe that

this action of the army engineers means a step toward a greater uniformity in lubricating specifications and a decided reduction in the type and grades that will be used after the war.

The engineers point out that while the War Department Lubrication Program is intended to simplify lubricants for army equipment to the lowest point consistent with efficient operation, there will actually be more than the ten mentioned lubricants available in the field. This is because the so-called standard lubricants will not completely perform the specialized functions of certain special fluids required for hydraulic brakes, shock absorbers and the like. However, with the trend toward simplification fully understood by refiners and lubrication engineers, it may be assumed that designs of the future will take into consideration the justifiable limitations imposed by the War Department, and some of these special fluids may be dispensed with eventually.

Another innovation introduced by the engineers in connection with lubrication is the employment of eight hours as a time unit. This method provides for proper and regular lubrication at the end of each 8-hour interval of use. In peace time, 40 to 60 hours may constitute a working week. On a military project or on two and three-shift private operations, a piece of earth-moving equipment often runs 24 hours a day. When this happens, the operator finishing the shift greases all points calling for 8-hour service before turning the equipment over to his successor.

Inspect More Often

Continuous and thorough inspection of all parts is another military mandate that the civilian operator will do well to follow. Frequent testing and scrutiny will anticipate many of the things that go wrong with a shovel. When proper adjustments are not made, wear increases and you have to repair or replace the part or assembly sooner. If indications point to something amiss, stop the shovel at once, find out what is causing the trouble and correct it. Only study and experience can teach you to recognize the little things which are the forerunners of greater mishaps.

Keep Chains Tight

Make sure that all chains are maintained at the proper tautness, and see that they are well greased at all times. This is especially true of the crawler drive chains and the chain-driven boom hoist. The tightness of the crawler belt should also be watched closely.

Repairs on clutches and brakes should be made carefully and always with the proper tools.

Chalk Disassembled Parts

When assemblies are taken apart, adjacent and related assemblies should be checked for wear at the same time. They are usually much more accessible at that time.

It is vital that all keys, pins, seals and other small items be restored in the same way and to the exact position from which they were taken. Careless reassembly after a repair or a replacement has been made can often do more damage than the original disorder. When disassembling a unit, all parts must be plainly marked—not only to facilitate reassembly, but to prevent injury from faulty position. Having a piece of mechanic's chalk handy may save hours of guesswork. Mark each piece and each position and you won't have to resort to the "trial and error" method.

Watch Front End

To maintain your front-end equipment at a high working standard, watch the cutting edges. A shovel, trench hoe, clamshell or dragline cannot dig effectively with dull, worn teeth. Teeth can be removed and replaced by the extremely simple operation of knocking out a pin. However, if new teeth are not available, the old ones can be built up by welding or, if badly worn, by tacking on a piece of repointer bar and then welding.

In connection with the shovel boom, check sheaves and cable frequently.

Make sure that the saddle block does not wear loose, and watch the bushings of the shipper shaft. Proper adjustment at all times will prolong the life of the crowd chain.

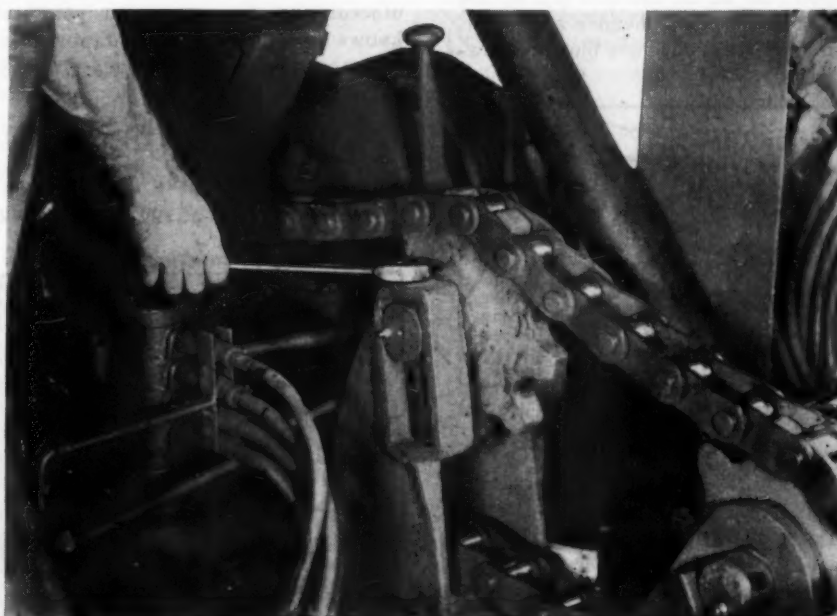
When the chain on your dragline shows signs of wear, it should be reversed as the greater wear comes on the bucket end. Mud, sand or other materials that you are digging should be kept out of sheaves, fairlead and other places where they might act as abrasives.

Remember that a drag line is a digging tool. It must not be used for cracking concrete slabs or pulling up stumps. It should also be lowered to a proper digging position instead of being allowed to drop on its nose or arches, an action extremely hard on front hitch plates, arches and the entire shovel; and one for which there is no excuse save carelessness.

Bear in mind, too, that when a clamshell has been used under water, the felt seals of the bucket should be changed every six months or oftener, instead of once a year.

Here are "Ten Commandments" of engine operation which will give you days free from engine trouble:

1. Know your engine thoroughly! Read the manual of instruction furnished by the manufacturer and do the things advised in it.
2. Keep engine and accessories clean. Dirt often hides trouble in the making. Look for loose connection or bolts as you clean.
3. Keep radiator filled with clean water. Never add water to an overheated engine.
4. Use only the oil of recommended specifications.



Tightening crowd chain of Buckeye shovel by adjusting deck idler

5. In starting, use the choke no more than necessary, as too much use of the choke allows gasoline to dilute the oil.

6. Warm up the engine slowly when the weather is cold. Never race a cold engine.

7. Do not force the engine—avoid over-load. When not using the engine—idle it; stop it if the period is prolonged, unless the weather is sub-zero; then allow the engine to idle.

8. If trouble develops, correct it before it becomes serious. Don't run

an engine that is not operating properly.

9. Always keep the air and oil filtering systems clean.

10. Personally inspect the engine and its accessories daily.

Take note when your engine is hard to start—when it misses—when it knocks—when it overheats—when it loses power—when you have a smoky exhaust—when it backfires—when the radiator boils—all these are definite indications that something is wrong, and should be immediately attended to by the operator.

Don'ts for Acetylene Operators

(From "Handbook for the Welding and Cutting Operator," issued by the International Acetylene Association, 30 East 42nd St., New York, N. Y.)

Do you use a stillson wrench on your torch or regulator connections?

Don't do it. It only chews up the brass and brass is scarce. It's easier to use a regular wrench, anyway.

Do you let other workmen or helpers use your torch?

Don't do it. It makes for poor work, possible accident and unnecessary repairs.

Do you rub your torch tip, nozzle or stem on the work to clean them?

Don't do it. It may remove the dirt or slag, but it will injure the orifices.

Do you use your blowpipe to pry plate or sheet apart?

Don't do it. A bar or chisel does it better, easier and cheaper.

Do you use your blowpipe as a hammer once in a while?

Don't do it. A hammer will do the job better, easier, cheaper and safer.

Do you ream out your blowpipe noz-

Don't do it. You might get hurt. This practice is hazardous as well as wasteful.



Always use correct pressures and the proper size tip or nozzle to get best results

Do you like to use oversize tips, nozzles or stems?

Don't do it. You can do better work with less gas and do it easier if you use the correct size. The manufacturer of the equipment you use knows something about the apparatus he makes. You'll do better work if you follow his instructions.

Do you like to use oxygen pressure that is too high?

Don't do it. Sparks flying a long way don't indicate you are cutting



Be sure to turn off the cylinder valves when you are through with the welding or cutting job



Use the correct size drill when cleaning tips or nozzles. Don't use steel wires

zle or tip with a piece of sharpened steel?

Don't do it. It makes for poor work, wastes gases and destroys the usefulness of the nozzle or tip.

Do you use oxygen to blow dirt from your clothing?

faster and you may start a disastrous fire.

Do you force a small welding tip or choke an oversize one?

Don't do it. Use the right size at full flame. You'll weld better and faster.

Do you leave cylinders turned on when you have finished a job or when you go to eat?

Don't do it. You encourage leakage when the regulator and torch valves are not turned off.

Do you turn back to the storeroom as empty (MT) cylinders that are part full?

Don't do it. They may not contain much oxygen or acetylene, but it should be used up. Mark each cylinder with the pressure left in it for the guidance of someone else.

Do you leave your torch on the floor, hung over a cylinder or lying on some work?

Don't do it. Someone may trip over the hose, the hose may get cut or the torch damaged.

A good workman is a SAFE workman, a GOOD housekeeper and one who is careful of tools.

REMEMBER

Don't neglect oxygen or acetylene leaks. They not only create a safety hazard but are extremely wasteful. The following table shows the number of cubic feet of oxygen, that may be lost in 1 hour, if at 100 lb. per sq. in. pressure, through orifices of various sizes.

Orifice Diam. In.	Cubic Feet per Hour	Equivalent to Cylinders
1/2	25,000	102
3/8	14,000	57
1/4	6,200	25
1/8	1,500	6
1/16	300	1 1/4
1/32	100	1/2

"HOW TO RECONDITION WORN PUMP SHAFTS AND RODS."

With the open-handed help of several pump manufacturers and specialists who were interviewed, this booklet is published to show how strategic materials can be saved by reconditioning worn pump shafts and rods for further service. All the procedures described here have proved their worth as workable and satisfactory methods. There is no unanimous opinion as to which is a better method than the others. They all present certain individual advantages and certain precautions which should be followed to get the best results. Each one is especially favored by those who have found it the most convenient or the most successful way to renew their own shafts and rods. Write for your copy to The International Nickel Company, Inc., 67 Wall St., New York, N. Y.

Maintenance Hints on Your Motors and Generators

The conditions under which this equipment is used on construction operations are generally most unfavorable to its enduring service. observes the Associated General Contractors' 75-page manual on "Conservation of Construction Equipment."* Inspections should be much more frequent and corrective action more thorough and pains taking than under ordinary circumstances.

Electric motors and generators are relatively simple mechanisms and their life may be maintained by carefully protecting them from the attacks of several natural enemies, and by prompt repair of damage in its early stages. A list of the causes of injury to which electrical equipment is particularly susceptible follows, with suggestions for prevention and cure of damage.

a. Overload

Motors and generators are usually rated by manufacturers below the capacities under which they will operate with reasonable economy. However, this factor of safety should not be over-worked. A motor or generator should be selected with careful regard for the load it is designed to carry and frequent inspections should be made to see that harmful overloads are not imposed from time to time. Overloading causes heat which is destructive to insulation, connections, windings and bearings. Protection against overloading may be secured by connecting into the main circuit one of the various types of overload relay switches OF PROPER CAPACITY for the purpose, or by installing SUITABLE fuses. Don't overload your motors or generators.

*Available at price of 50c on request to Associated General Contractors of America, Inc., Munsey Bldg., Washington, D. C.

b. Underload

The consequences of underloading are ordinarily not so serious as overloading. However, it results in serious inefficiency and may cause considerable damage. This is particularly true of induction motors. The effects are similar to those which are caused by the continued idling of a gasoline engine. A serious waste of electric current results, usually accompanied by overheating. The low power factor of underloaded induction motors causes, besides waste of current and high line losses, an actual loss of torque in the motor itself. Here again a machine having a load capacity corresponding to the load to be carried should be selected.

c. Friction

This most destructive cause of injury should be guarded against by every means. There are many possible causes but the remedies are simple. Very frequent inspection will immediately suggest the proper preventive measures which should be acted upon PROMPTLY. First quality lubricants of grades recommended by the equipment manufacturer should be judiciously used. The excessive use of lubricants may also cause serious damage. Loose oil and grease should be frequently removed.

Never replenish lubricant in ring-oiled bearings while the machine is running. A surplus of oil will probably result which will cause trouble. Oil belongs in the bearings and should be kept there.

d. Dust

Always a serious menace to the life of electric machines, dust is a most serious problem on construction projects because of the nature of the work. If permitted to accumulate it will find its way into bearings and



WGB

**Removes Grit and Water
Without Affecting Modern
Oils**

Many of today's best oils contain detergents to keep varnish from forming. Many of today's oil filters remove these additives. But not W.G.B. The big fibre cartridge in W.G.B. Clarifiers removes grit, water, and colloidal carbon, leaving the oil amber-clear with all its protective properties. Refills are cheaper than oil changes and are made quickly and without tools. Specify W.G.B. for a sturdy, simple proved clarifier which saves time, money, oil, overhauls, and irreplaceable engine parts.

Write today for
this free book.
See why
W.G.B. Clar-
ification
pays. See
correct mod-
els for gas
and Diesel
engines.



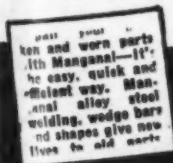
WGB

OIL CLARIFIER, INC.
KINGSTON, N. Y.

Don't Scrap it - Weld It

THE TIME IS NOW!

For speedy, wartime emergency repair welding, you can't beat MANGANAL WELDING PRODUCTS. With MANGANAL you can meet every requirement for efficient, fast, durable repair welding.



STULZ-SICKLES CO.
NEWARK, N. J.





RBC

ROLLER BEARINGS

Help Build and Maintain

The Nation's Roads

ROLLER BEARING COMPANY
of AMERICA

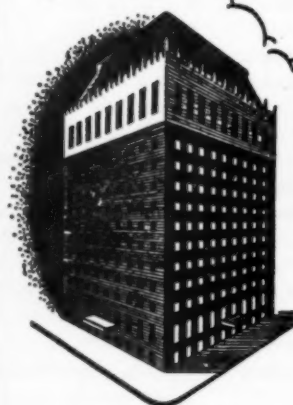
28 Whitehead Road

Trenton, N. J.

Omaha is Proud...



of this outstanding hotel, noted as the civic, social and travel center of the city. There's far more to enjoy but it is far from being expensive.



HOTEL FONTENELLE

Official A.A.A. hotel. Home of the National Aeronautic Assn. Headquarters of civic clubs including: Rotary, Kiwanis, Blue Goose, Lions, Optimists, Ad-Sell, Omaha Executives.



commutators, causing damaging friction and wear. Moisture and stray oil will carry it into armature and field windings causing damage to insulations and clogging of air passages, which in turn results in serious overheating.

Every possible means should be used to prevent accumulation of dust and dirt on electric machines. It should be frequently and carefully removed so as to prevent its getting into bearings and other places where it may do harm. It may be removed from windings by the careful use of compressed air or hand operated bellows. Oil filler caps, gaskets and dust sealing rings should be frequently inspected and replaced if worn.

e. Moisture

The rotating parts of electric machines are usually designed so as to draw air through the windings. Often this air carries moisture which when it condenses on insulations becomes pure distilled water. It is then exceedingly harmful because of its capacity to absorb destructive acids and other elements which are ruinous to insulations and connections. Electric equipment should be fully protected from moisture by every practical means. It should be frequently in-

spected and if the presence of harmful moisture in the windings is suspected or found by resistance tests to exist, it should be promptly eliminated. This may be accomplished by careful drying in an oven if one is available, by forcing warm air through the windings by means of a fan, or by covering the machine with a tarpaulin vented at the top and base for air circulation and introducing, under the canvas, two or three electric light bulbs. Care must be used to in-

sure that the drying temperature does not exceed the boiling point of water.

f. Mechanical Maladjustments

Some of these, which may cause serious damage to electric machines if permitted to continue, but which may be readily detected by careful inspection and easily corrected are,—driving belts or chains too tightly adjusted causing friction and wear; bearings too tightly adjusted causing friction; revolving parts out of balance causing destructive vibrations, throwing shafts out of alignment with driven members causing excessive and uneven wear in bearings. In gear drives, worn or improperly meshed gears cause destruction of driving shafts and abnormal wear in bearings. Faulty adjustment of commutator brushes causes uneven wear on commutators and loss of power.

Motors and generators should always be securely fastened to their mountings.

Electric machines should be carefully protected from the elements both in storage and in use. They should be kept dry and clean and, when not in use, carefully covered by tarpaulins or other suitable protection. Frequent careful inspection is essential.

TRANSITS
and LEVELS

HEADQUARTERS
FOR REPAIRS—
—any make—

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalogue RS 8-7 of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

WARREN-KNIGHT CO.

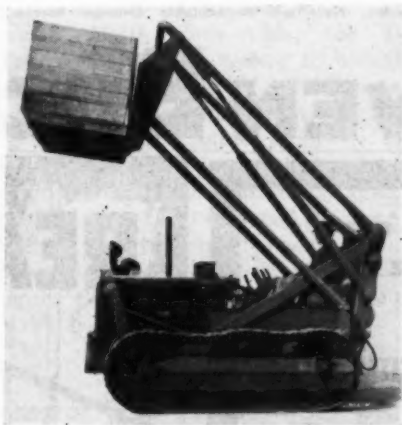
Mfgs. of Sterling Transits & Levels
134 N. 12th St. • Philadelphia, Pa.

New Equipment and Materials

Cargo Loader for Planes

Cargo planes are now rolling off assembly lines in ever increasing numbers. They are hauling unheard of tonnages—by air—to all parts of the world. Many of these points have new air fields—hewn out of the jungle—leveled off in the desert—or plowed out of the snow. One of their problems is to load and unload the cargo planes under all conditions as they find them. The new Pioneer Cargo Loader, manufactured by the Pioneer Engineering Works of Minneapolis, Minnesota, has been designed to answer this problem. The Pioneer Cargo Loader is mounted on a track type tractor, so it has good traction under any ground conditions. Furthermore, the tractor can be used for other work, such as moving planes, loading snow, bulldozing or towing freight. When the load is down in carrying position—the highest point is under 7 ft., which will pass under the wing of any of the cargo planes. Furthermore, the operator has a clear, unobstructed view in all directions. The Pioneer Cargo Loader will pick up, from ground

level, and load into a plane with a floor 10 ft. above ground level. For handling a quantity of packages—a pallet or platform is available. The plat-



New Pioneer cargo loader

form can be loaded with the freight for a scheduled flight. When the plane is ready, the Cargo Loader picks up the platform with its load and sets it in the plane door for unloading and

distribution in the plane. The Loader is operated by two hydraulic rams, taking power from the tractor. It is controlled by levers within easy reach of the tractor operator.

New A.C. Electrode

Coincident with their recent announcement of a new line of P&H A.C. industrial arc welders, the Har-nischfeger Corporation, Milwaukee, Wis., has introduced a new all-position electrode designed especially for use with A.C. transformer welding machines. Suited for all mild steel applications, it is being made in the usual sizes of $\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, $\frac{1}{4}$ and $\frac{5}{16}$ in., and 14 and 18 in. lengths, packed in standard 50-pound containers. Detailed information and welding procedures are available on request.

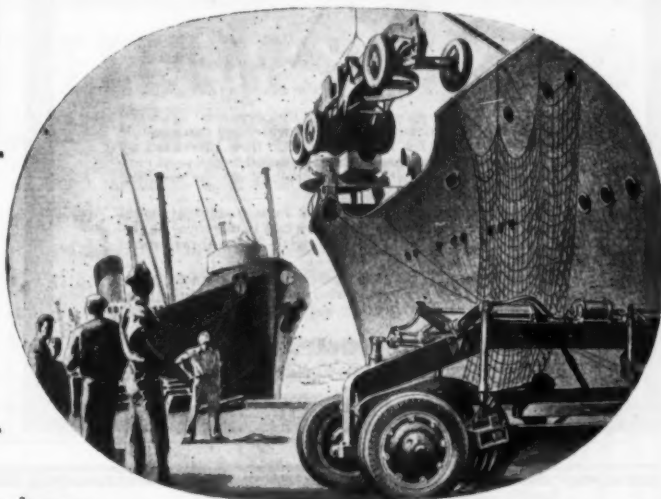
New White Pencil Tracing Cloth Is Moisture Resistant

The Frederick Post Company of Chicago has just recently developed a new greatly improved White Pencil Tracing Cloth—WHITEX.

One of the new outstanding features of WHITEX is that it is moisture resistant on both sides. Drafts-

AS BUSY AS BEES

These Contractors of the NAVY



DO YOUR PART



The Job of the Seabees, the Navy's construction battalions, is right down your alley. This outfit follows the Matines, building docks, bridges, airfields and roads. The "Seabees" know Galion rollers and graders . . . know that they are dependable. They need men like you who know the construction game . . . men who want action close to the scene of action.

THE GALION IRON WORKS & MFG. CO.

MAIN OFFICE AND WORKS: GALION, OHIO



Built to Hit and **HIT HARD!**

An Owen digging bucket is specifically designed to be dropped on the material so that the teeth and lips *hit hard* and dig in. Thus, they get "a mouthful at every bite" in the hardest digging material.

The OWEN BUCKET Co.

Breakwater Avenue, Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.

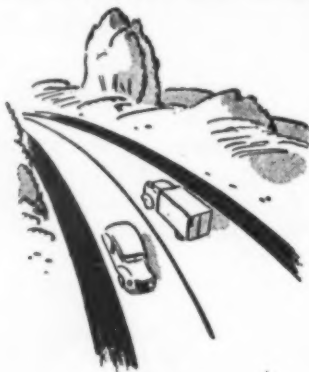


OWEN BUCKETS

ASPHALT

for

HIGHWAY WIDENING AND MAINTENANCE



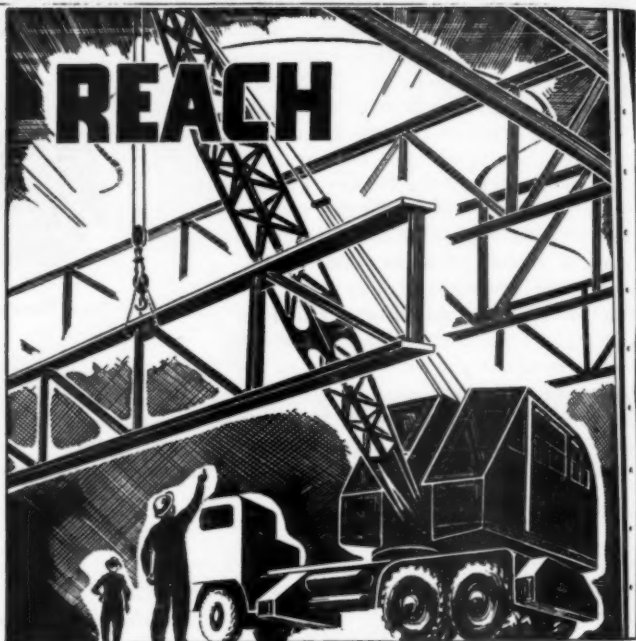
As an emergency measure, highway widening can provide adequate capacity for handling traffic flow increased by defense activity. This saves the delay and expense of constructing new roads which may or may not be required in normal times.

Asphalt construction offers the fastest and simplest method of getting results. Not only can it use local aggregates, but Asphalt can be laid with little interference to traffic.

Wherever Standard Oil Asphalt products are sold, there is an Asphalt representative who can give you full information about these and other uses of Asphalt. Write . . .

STANDARD OIL COMPANY (Indiana)

910 SOUTH MICHIGAN AVENUE, CHICAGO



5- to 12-Ton Capacity * Air Controls

Reach out . . . get more construction and materials-handling jobs done faster with wheel-mounted MICHIGAN Mobile Cranes! Bulletin C describes time-saving, cost-cutting MICHIGAN features.



ROGERS BROTHERS
CORP.
ALBION, PENNA.

Bulky, cumbersome machinery, and of late heavy pieces of defense equipment must be moved from place to place. In some localities, where low headroom is encountered, this type of Rogers Trailer is used extensively.

Large machines, with crawler treads "straddle" the girders thus lowering the overall height by several inches, a definite advantage also in handling many kinds of equipment.



men know the importance of this feature to guard against spots from perspiration or moist hands. Too often these spots show up to mar the prints from the finished drawing.

In many parts of the country the moisture-resistant surfaces of WHITEX are stated to be a safeguard against climatic conditions.

This feature plus the glass-like transparency of WHITEX assures prints that are etching sharp. These are vital factors necessary to blueprints with a rich, uniform background and sharp white detail.

Samples of this new white pencil tracing cloth can be secured by writing The Frederick Post Company, Box 803, Chicago.

Airborne Tournapull

A Tournapull that can be airborne and even crash-landed for war-time use on fighting fronts is being introduced by R. G. LeTourneau, Inc., Peoria, Ill. Equipped with a 2-yard Carryall Scraper and Tiltadozer, the D Tournapull has a "flying" weight of only 3¼ tons. Big, pneumatic rubber tires give the unit more than ample flotation on soft surfaces, and enable it to carry heavy loads over concrete roads and runways. It pos-



D Tournapull

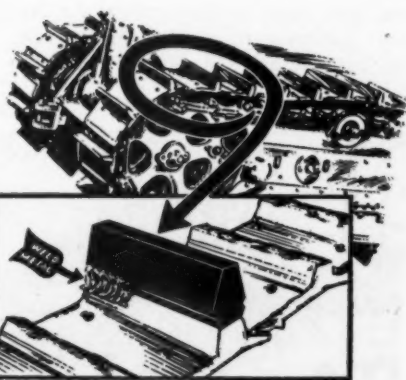
sesses speeds up to 18.8 miles per hour. Easily convertible, the D Tournapull may be hooked to a flat-bed trailer capable of trucking a 7,000-pound tractor, ammunition, guns or other military supplies, an 800 to 900-gallon fuel tank, or other weight equivalents. A LeTourneau Crane, capable of up to 4,000-pound lifts, can replace the trailer. In addition, a powerful Rooter tooth is attachable to the Scraper to rip through baked earth or similar hard surfaces.

Tractor Grip-Lug Salvages Old Worn Grouser-Shoes; Saves Metal

With many tractor owners overhauling their equipment, and the difficulty in securing new repair parts, or the delay ensued in waiting for de-

livery of such parts, contractors will welcome the news of a recent development of the Allied Steel Products, Inc., Cleveland, Ohio, of their Bulldog brand tractor grip-lugs.

Worn grousers on tractor-shoes cause tracks to slip and slide over the terrain with resultant loss in traction efficiency, fewer and smaller loads per day, increased cost of handling—besides delay and loss of valuable time on other equipment on the job.



It is now unnecessary to tear down the track assembly and replace the worn grouser-shoes with new parts, when a simple repair operation will restore the "gripping power" of the



● The coveted Army and Navy E Pennant awarded for excellence in production now floats proudly above the Wellman plant.

WILLIAMS Buckets ARE BITING INTO FROZEN GROUND and TROPIC MUCK

● Williams Buckets are very much in active service in the wide-flung war offense. Concrete-hard, frozen ground is being broken by the sharp teeth of Williams Buckets in far north road building. Deep in jungles Wellman Buckets are digging and dredging. At ore mines, over stock piles and railway cars, and in steel mills Williams Buckets are literally moving mountains to help beat the Axis.

built by
**THE WELLMAN
ENGINEERING COMPANY**

7003 Central Avenue • Cleveland, Ohio

track. This is accomplished merely by welding on to the old grouser-shoe a specially designed steel bar, with a groove and bevel to facilitate laying welding bead along the edge which holds the bar and the grouser-shoe together as in a vise. The material is a special analysis work hardening steel which gets harder and tougher with use, and often outlasts the original grouser.

Over 80 per cent of the metal of the old shoe is thus salvaged, releasing that much critical metal for urgent government needs. Meanwhile, the contractor has put his tractor

back into good condition, at considerably less replacement cost and without delay. New and informative lit-

erature has just been issued describing the material and methods of application, free upon request.

New Trade Literature

"LOWER EARTHMOVING COSTS IN WAR AND PEACE," is the latest in a current series of service brochures now being released by R. G. LeTourneau, Inc., of Peoria, Ill.

The eight-page, colored booklet

thoroughly illustrates "how LeTourneau equipment you have job-proved helps win the war." Complete shop service, rapid repair aid, dealer help in job planning, use of factory instruction books, service charts and other pamphlets on operation, tire and parts conservation, training of "green" operators and many other subjects are fully explained.

The brochure may be obtained from any LeTourneau-"Caterpillar" dealer, or by writing direct to the factory and asking for Form No. A-36, Earthmoving Specialist Folder.

"ELECTRIC VIBRATING EQUIPMENT, CATALOG 750." A valuable 176-page illustrated catalog and data book of this title has been published by the Jeffrey Manufacturing Co., Columbus, Ohio. It includes chapters on Jeffrey-Traylor vibrating feeders, constant-weight feeders, bin valves, conveyors, dryers, coolers, packers, screens and electrical equipment.

A new booklet, "IDEAS to HELP YOU KEEP YOUR PRESENT EXCAVATORS WORKING AND DOING MORE TO WIN THE WAR," free to owners and operators of shovels, cranes and draglines is announced by Bucyrus-Erie Company.

Containing no advertising or extraneous material, this 32-page, 5½ x 8½ booklet, attractively illustrated and printed in two colors, is packed with practical, experience-tested suggestions on how to maintain maximum excavator production. More than 100 brass-tacks tips on the proper operation and care of excavators, regardless of make, are given under the following headings:

Old and New Ideas for Short Cuts and Savings.
Suggestions for the Boss.
Suggestions to the Operator.
Adjustments.
Keep Lubrication Clean.
Lubricate Regularly.
Prompt Repairs Save Time, Work, Money.
Short Moves Often Dig More Dirt.
Keep Power Plant Humming.
Shove Up Your Shovel Output.
Special Helps to Better Dragline Performance.
Hints That Help to Increase Crane Output.
Safety First.

Copies may be secured from your nearest Bucyrus-Erie distributor, or by writing direct to the firm's publicity department, South Milwaukee, Wis.



In Its 4th Decade of Service

—WITH NO MAJOR MAINTENANCE EXPENSE



Write for copy of this pocket-size BITUVIA manual.

☆ Now in its fourth decade of service, this paving job on Butler Ave., Indianapolis, is proof of the long, economical service which BITUVIA gives. The original surface is still intact, and there has been no major maintenance expense.

BITUVIA is especially adapted to maintenance and repair work. It is quickly applied, penetrates deeply, and binds the aggregate firmly. Standard grades to meet all Federal, State, County and Municipal specifications.

PLASTUVIA CRACK FILLER—A waterproof filler which binds firmly to brick and concrete—filling and sealing cracks and openings to prevent water damage. Will not flow in summer nor crack in winter.

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana
2513 S. DAMEN AVENUE, CHICAGO, ILLINOIS 300 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.
SEVENTEEN PLANTS TO SERVE YOU

Covered Bridge to Be Preserved by Highway Commission

The historic covered bridge, which formerly carried Road 52 traffic over Flat Rock River at the southeast limits of Rushville, will be preserved by the Indiana highway commission as an example of pioneer road construction, according to S. C. Hadden, chairman. The bridge will become the central feature of a roadside park, plans for which are being prepared for the commission's approval.

CORONACH

*"Of those immortal dead who live again
In minds made better by their presence."*

HENRY M. TOOLE, president and treasurer of the Cleveland Formgrader Co., manufacturer of concrete road equipment, died June 25 after an illness of six weeks. He was 43 years old. He had been head of the Formgrader concern for the last 10 years. Prior to that he was purchasing agent for the Lakewood Engineering Co.

GEORGE COBB, chief engineer of the city of Baltimore, Md., died June 17 as the result of an automobile accident. As chief engineer, Mr. Cobb was a member of the Board of Estimates, the policy making body of the municipality. He also was head of the Department of Public Works and ex-officio member of the City Plan Commission. Mr. Cobb was born in Baltimore on December 30, 1889.

Mr. Cobb's engineering career began in 1912 when he became an asphalt inspector of the old Paving Commission, in 1914 becoming assistant chief asphalt inspector. Mr. Cobb took night courses in engineering chemistry at the Johns Hopkins University. In 1912 he was appointed an asphalt inspector of the old Paving Commission. In 1914 he was promoted to assistant chief asphalt inspector. Mr. Cobb resigned from city employ in 1918 to enlist in the flying section of the Signal Reserve Corps, United States Army. He graduated from the School of Military Aeronautics at Princeton, N. J., and later took a course at the School of Fire for aerial observers at Fort Sill, Oklahoma. Later he studied at the School of Aerial Observers at Post Field, Oklahoma. He was commissioned a second lieutenant. Mr. Cobb returned to Baltimore in 1920 with the Bureau of Highways as asphalt-materials engineer. He served as highways engineer of Baltimore from 1931 to 1939. He was graduated from the law school of the university in 1929 and later was admitted to the bar. In 1921 Mr. Cobb assisted in the formation of the One Hundred and Fourth Air Squadron, Maryland National Guard, and served with it for twenty years.

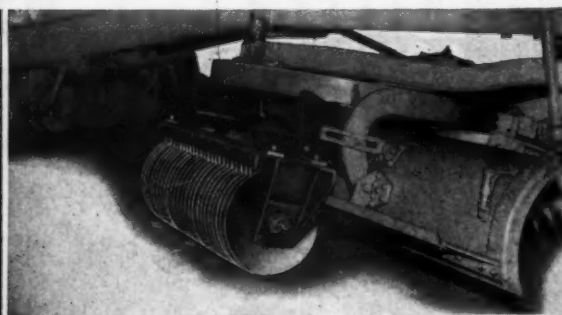
DAVID A. HEMSTREET, of Hemstreet & Bell, highway contractor of Marysville, Calif., was killed June 22 in a gravel plant accident. He was 45 years old. The contracting firm, organized in 1920, has built many important projects in northern and central California. Hemstreet was director and past-president of the Northern California chapter of A.G.C.

Double the Utility of Your Motor Grader!

with Baker Disc Attachment

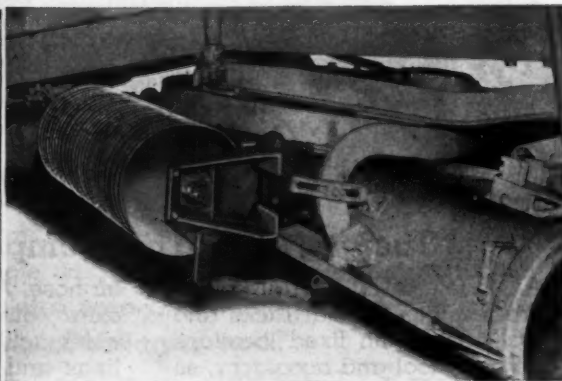
Makes graders a two-purpose equipment. Use the disc to cut up black-top, oiled earth and other bituminous roads or gravel—use the blade for grading the cut surface.

Disc In Working Position



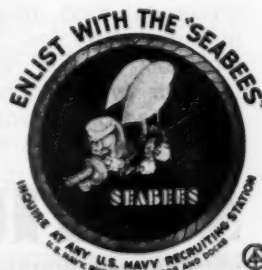
When not in use, disc can be raised out of the way in a few minutes.

Swung To Carrying Position



Model 249 shown is readily attached to most makes of graders. Model 149A fits on front of blade of all makes. Choice of disc spacing. Send for Bulletin 831.

THE BAKER MFG. CO.
506 Stanford Ave.
Springfield, Ill.



BAKER

The Modern Tractor Equipment Line
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

ROADS AND STREETS, July, 1943

With the Manufacturers

Sullivan Wins Army-Navy Award

The Army-Navy "E" award for production excellence was made to the employees of the Sullivan Machinery Company, Michigan City plant, in an impressive ceremony.

Rear Admiral H. G. Taylor, U. S. Navy, presented the "E" flag to F.

W. Copeland, Sullivan Machinery Company president. Colonel Martin H. Ray, U. S. Army presented "token" pins to veteran employees of the company. Mr. Arthur S. Knoizen, Director, Mining Equipment Division of the War Production Board, spoke briefly about the remarkable production record established by the Sullivan employees. Nearly 1,500 people

attended the ceremony, which was held in a beautiful woodland setting on the plant grounds.

American Brake Shoe Advances J. L. Mullin

Joseph L. Mullin has been appointed general superintendent of foundries for the American Manganese Steel Division of the American Brake Shoe Company. He had been works manager at the New Castle, Del., plant; but will operate in his new position from the offices of the company at Chicago Heights, Ill. Mr. Mullin was employed in 1914 by the then Edgar Allen Manganese Steel Company as clerk in the annealing department. He rose through successive stages to the positions of local purchasing agent and foundry superintendent, becoming works manager in 1928. W. F. Kelly, plant superintendent at New Castle, has been named works manager at that place to succeed Mr. Mullin. He joined the American Manganese Steel Division in 1925 and has advanced through various positions. The foundries of the American Manganese Steel Division of the American Brake



W. F. Kelly

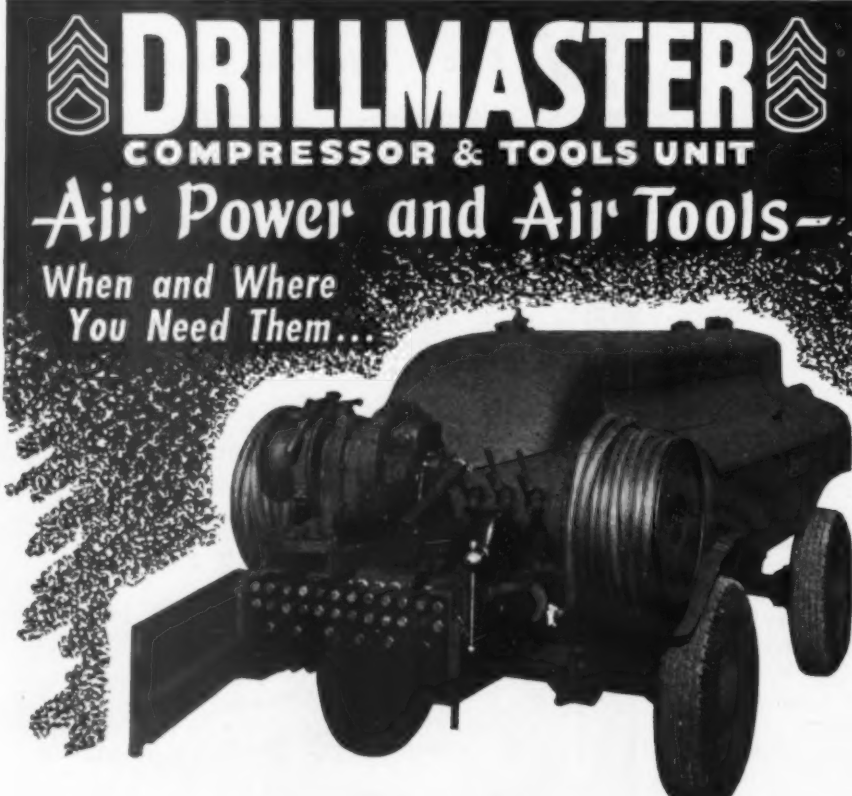
Shoe Company, which will be under Mr. Mullin's supervision, are located at Chicago Heights, Ill., New Castle, Del., Oakland, Calif., Denver, Colo., Los Angeles, Calif., and St. Louis, Mo. The company is now engaged in supplying steel castings to contractors, industrial plants and mines engaged in the war effort. It also manufactures centrifugal pumps, excavating equipment and welding rod.



J. L. Mullin

M. B. Garber Appointed Director, Construction Machinery Division

M. B. Garber has been appointed Director of the Construction Machinery Division of the War Production Board according to an announcement by Donald D. Davis, Operations Vice Chairman. Mr. Gar-



DRILLMASTER
COMPRESSOR & TOOLS UNIT
Air Power and Air Tools—
When and Where
You Need Them...

They're All in This Complete Unit

A Model 105 SCHRAMM Compressor with special racks and tool boxes with fixed locations for each tool and accessory, so that most any compressor requirement that arises can be met and handled. Equipment includes: Double hose reels, five air type, each equipped with three 50 ft. lengths of 3/4"

air hose. Air receiver with three extra outlets, equipped with quick action valves, hose couplings and 3 1/2" vise for flat or pipe work, on swivel base. Tools recommended depend entirely on users' requirements and the ability of tool manufacturer to furnish them under existing conditions.

Write Today for Bulletin C-9

SCHRAMM, INC.
THE COMPRESSOR PEOPLE
WEST CHESTER, PENNA.

ber came to the War Production Board in May, 1942, and has been Acting Director of the Construction Machinery Division since April 3, 1943. Previous to joining WPB, he was export and assistant sales manager of The Thew Shovel Company of Lorain, Ohio. Mr. Garber resides in Elyria, Ohio.

Neslage Becomes General Sales Manager for Sullivan

The Sullivan Machinery Company announces the following:

Mr. O. J. Neslage has been appointed General Sales Manager. Mr. Neslage has an extensive background in the application of all Sullivan equipment as the result of many years



O. J. Neslage



J. N. Rolston

of experience with this company. He has served as manager of the company's Mexico City, Joplin, Salt Lake City and New York territories, which gives him a thorough knowledge of the mining, oil, construction and industrial fields.

Mr. J. N. Rolston has been appointed Assistant General Sales Manager. Mr. Rolston has had 13 years of experience with the company, including 5 years as Assistant General Manager of the company's Canadian subsidiary.

Hughes-Keenan Co. Gets Army-Navy "E"

Nearly a thousand persons visited the plant of The Hughes-Keenan Company, Mansfield, Ohio, on May 7th to see the men and women who make Roustabout Cranes honored with the Army-Navy "E", first of such awards in Mansfield. The flag was presented by Major W. B. McClelland of the Cleveland Ordnance District, representing the Army; the "E" pins by Lt. Commander A. E. Heiser, Resident Inspector of Naval Material at Mansfield, for the Navy. A. E. Hesselden accepted for the employees and G. W. Way, President, for the management.

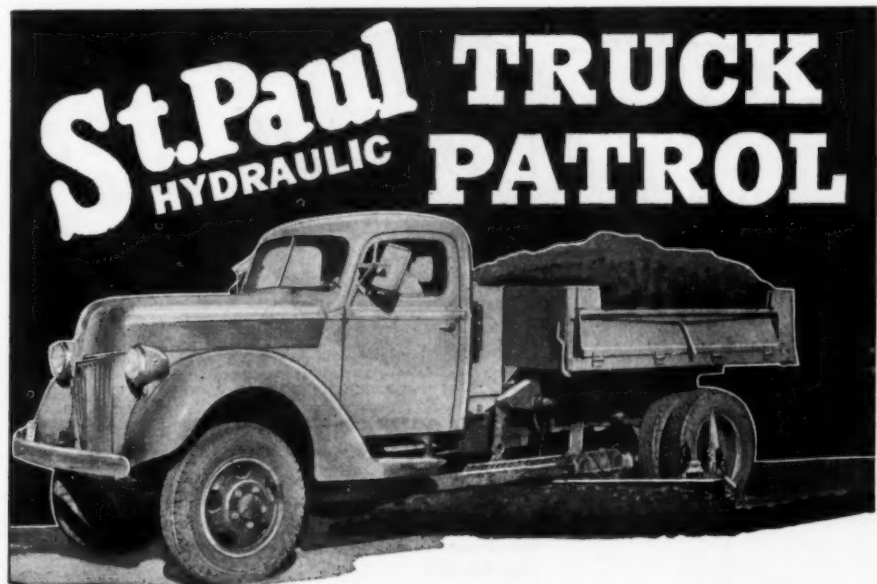
Haddock Becomes President of Farrel-Birmingham Co.

The Sullivan Machinery Company regrets to announce the resignation, effective May 1, of John W. Haddock, to become President of the Farrel-Birmingham Company of Ansonia, Conn.



J. W. Haddock

Mr. Haddock, during his association of more than 20 years with Sullivan, advanced progressively from an apprentice to vice-president in charge of engineering and sales. He is a member of the American Institute of Mining and Metallurgical Engineers and the Army Ordnance Association and was active in the affairs of the Compressed Air Institute and the American Mining Congress, having been chairman of the manufacturer's division of the Congress during the past year.



RESURFACING



DITCHING



HAULING



MIXING OIL



SHAPING SHOULDERS

THE ALL-PURPOSE ALL-SEASON MAINTENANCE UNIT!

Now, more than ever you'll find the St. Paul Hydraulic Truck Patrol the ideal road maintainer. Saves gasoline—saves tires—saves manpower. This one-man operated, single unit, performs over a dozen separate maintenance jobs. That's putting your "maintenance dollars to work!"

Only St. Paul has the patented "Levelizer Control" this means "cutting"—not "scraping" therefore less power is required.

But get the whole story—send for Bulletin No. 37-86 today.



ST. PAUL HYDRAULIC HOIST CO.

2207 UNIVERSITY AVENUE, S. E.
MINNEAPOLIS, MINNESOTA

Mall Tool Co. Gets "E"

The Mall Tool Co., 7440 South Chicago Ave., Chicago, Ill., was awarded the Army-Navy "E" on June 22.

F. I. Lackens Elected President NIAA

Frederic I. Lackens, advertising manager of The Hays Corporation, Michigan City, Ind., was elected president of the National Industrial Advertisers Association, Inc., at their annual election of officers held in conjunction with their Central Regional Wartime Conference at the Hotel Statler, Cleveland, June 25. Vice-

presidents elected were: Alan Ballantyne, advertising manager, Novo Engine Company, Lansing, Mich.; Walter A. Bowe advertising and public relations manager, Carrier Corporation, Syracuse, N. Y.; Wilmer H. Cordes, manager, Sales promotion-advertising, American Steel & Wire Company, Cleveland, O.; Edward V. Creagh, sales, promotion manager, American Chain & Cable Co., Inc., Bridgeport, Conn.; John A. M. Galilee, assistant advertising manager, Canadian Westinghouse Co., Ltd., Hamilton, Ont., Canada; John H. Kunkel, director of public relations and advertising, The Fluor Corpora-

tion, Los Angeles, Cal.; J. M. McKibben, manager, promotion and training, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.; Graham Rohrer, assistant to vice-president, Baldwin-Hill Company, Trenton, N. J.; Arnold Andrews, assistant manager, publicity, Bucyrus-Erie Company, South Milwaukee, Wis., continues at the post of secretary-treasurer.

LeTourneau Parts Chief Is Named

R. G. LeTourneau, Inc., of Peoria, Ill., announces the appointment of Gordon S. McKenty as general parts department manager, to supervise parts sales, orders and shipping activities for the earthmoving machinery company.



Mr. McKenty came to LeTourneau in 1935, serving as a district representative from then through 1941 in various northern areas from Wyoming and Montana eastward through New York and the New England states. In May of 1942 he went to the LeTourneau plant at Tournapull, Ga., as an official in the shell manufacturing division. In more recent months he has been an expeditor on government munitions contracts, working out of both the Georgia and Vicksburg, Miss., LeTourneau factories.

Changes in Caterpillar Personnel

D. A. Robison has resigned as Vice President of Caterpillar Tractor Co., Peoria, Illinois, to become the Company's distributor at Salt Lake City, Utah, and Gail E. Spain, who was made a Vice President in May, 1942, will succeed him as administrative Vice President of the Advertising, Sales, Export, Engine Sales, Special Products and War Contracts Departments, according to an announcement by L. B. Neumiller, President of "Caterpillar."



D. A. Robison



GIVING VICTORY A LIFT

ON highways leading to the far-flung battlefields of the world, Cargo Bodies built by the Hercules Steel Products Company are carrying vital materials of war in unbroken lines to our fighting men and their allies.

Hercules Dump Cargo Bodies, too, are giving dependable service in many camps and on many fronts, both at home and abroad.

With so large a proportion of our capacity occupied by war production, it's only natural that our distributors' stocks of Hercules Dump Bodies should be low. However, when you need new equipment for any essential project or a war contract, the Hercules distributor can take care of you, and the same Hercules representative will keep your present Hercules Hydraulic Hoists and Bodies operating at greatest efficiency, if you'll call on him when you need service.

HERCULES STEEL PRODUCTS COMPANY
GALION, OHIO



- REMEMBER THESE FEATURES OF
- Exclusive Center-Lift Action
 - Double Bridge-type Lift Arms
 - Balanced Piston Valve, with Finger Tip Control
 - 6", 7", 8" and 10" Hoists



J. M. Mc-
otion and
ec. & Mfg.
Graham
-president,
renton, N.
tant man-
-rie Com-
Wis., con-
secretary.

Chief

of Peoria,
tment of
eral parts



McKenty
d in vari-
Wyoming
ugh New
d states.
the Le-
ll, Ga., as
facturing
months he
vernment
g out of
icksburg,

illar

igned as
r Tractor
ome the



Robison
al Prod-
rtments,
nt by L.
"Cater-

Formal transfer of the distributorship will occur some months hence.

Because of his many years in the "Caterpillar" organization, and the breadth of his experience, Mr. Robison is exceptionally well qualified to assure a continuance of the fine service the Landes organization has extended to its customers for two decades.

Mr. Robison, a native of Nevada, was graduated from the University of Nevada with a business degree and almost immediately became associated with "Caterpillar," starting in the shipping room of the Parts Department at San Leandro, California in 1926. He advanced rapidly through various positions in the Credit and Treasury Department to the office of Assistant Treasurer, Treasurer and then General Sales Manager. He was promoted to Vice President in 1940.

Mr. Spain, who has been in charge of operations at San Leandro since his elevation to Vice President, is returning to Peoria to assume his new responsibilities.



G. E. Spain

A native of Portland, Oregon, Mr. Spain was graduated from Oregon State College in 1920 with the degree of Mechanical Engineer. After his graduation he joined the Willamette Iron & Steel Works at Portland and spent nine years in the Sales and Engineering Departments and as Sales Manager.

He joined "Caterpillar" in 1929 as Logging Representative. Succeeding administrative positions in the Merchandise, Engine and Engine Sales Departments and in the Sales Development Division culminated in his appointment as General Sales Manager in 1940, followed by a Vice Presidency last year.

Redfern With LaPlant-Choate

LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, announces the recent appointment of Jack Redfern as District Representative in the Pacific Northwest territory. Mr. Redfern will cover the states of Washington, Oregon, Idaho, Western Montana and British Columbia, work-



Jack Redfern

ing closely with LaPlant-Choate—"Caterpillar" distributors and their customers, in connection with the company's complete line of earth moving, land clearing and snow removal equipment. He will continue to make his headquarters at the Spring Apartment Hotel in Seattle. Prior to his association with LaPlant-Choate, Jack Redfern traveled the Pacific Northwest for the past eleven years with the D-A Lubricant Co., Indianapolis, promoting special lubricants for tractors and heavy duty equipment. His earlier business connections include three years as representative for the

Euclid Road Machinery Co., Cleveland, and six years as sales manager of Power Mfg. Co., Marion, Ohio.

Appointed Factory Production Representative

Willard A. Luli, engineer with The Cooper-Bessemer Corporation for the past eight years, has been promoted to the post of Factory Production Representative for the company's two plants at Mount Vernon, Ohio, and Grove City, Pa.

In his new assignment, Luli is affiliated with the company's Washing-

STAMP OUT DECAY!

APPLY OSMOPLASTIC to these Danger Spots

1 Where piling touches cap and sway-bracing.

2 Between and atop planking joists. Also where laminated deck seats contact cap (when treated planking not available).

3 At the ground-line or waterline of piling.

4 Where rail posts touch handrails, hub guards, deck and cap.

Highway engineers who "know their stuff" know that decay of bridge timbers means heavy repair costs...plus valuable man-hours lost! And with treated timber mighty scarce today, effective "spot" treatment is the only way to prevent rot.

Apply OSMOPLASTIC to the vulnerable sections where decay usually starts. Wherever timber touches timber...or humid earth...or stands in water...OSMOPLASTIC adds extra years of service.

The cost of applying this superior wood-preservative with ordinary labor is amazingly low. OSMOPLASTIC protects all your timber installations, whether bridges...culverts...highway guard-rails...guide or fence-posts.

Save your timbers today from decay tomorrow...with OSMOPLASTIC!

(P. S.: Osmoplastic has a surface coverage of approximately 75 sq. ft. per gallon!)

Osmose Wood Preserving Company of America, Inc. Dept. R
1437 Bailey Avenue, Buffalo, N. Y.

Please send me full information on Osmoplastic applications.

Name _____

Address _____

City and State _____

OSMOSE

WOOD PRESERVING
COMPANY of AMERICA, Inc.
BUFFALO, N. Y.

DENVER CHICAGO NEW YORK
KENOVA, W. VA. BIRMINGHAM
SEATTLE SAN FRANCISCO

plants at Mount Vernon, Ohio and Grove City, Pa.

In his new assignment, Luli is affiliated with the company's Washington, D. C., office where he serves as Cooper-Bessemer representative on the War Production Board for the Large Diesel Engine Manufacturers' Planning and Scheduling committee.



W. A. Luli

Henry H. Howard Becomes "Caterpillar's" Gen. Sales Manager

Henry H. Howard, who has been associated with Caterpillar Tractor Co. since 1926, is returning from a war-time post with the U. S. Ordnance Department in Detroit to become "Caterpillar's" General Sales Manager.

Mr. Howard was manager of the Engine Sales Department of the company when called for temporary emergency duties in the War Department in February, 1942. He has served as consultant to Brig. General J. K. Christmas of the Tank and Combat Vehicle Division of the Ordnance De-

partment, which has consented to release him from his duties in that department.

J. Q. McDonald, who assumed the extra burdens of the General Sales Manager's office in addition to his regular duties as Export Manager when G. E. Spain was promoted from general sales manager to a vice-presidency in May, 1942, will now be free to devote his broad experience and full time to planning and preparing for the problems and enlarged opportunities that will exist in the export field.

H. W. Smith, Assistant Manager of Engine Sales, who has been in active charge of that department during the time Mr. Howard has been in government service, has been made Manager of Engine Sales.

Army-Navy "E" Awarded Cleaver-Brooks Co.

On May 28, 1943, the Medical Corps, U. S. Army, awarded the Army-Navy E to the Cleaver-Brooks Company, Milwaukee, Wis. This is the first midwest manufacturer to be so honored by the Army Medical Corps. The award was conferred "for outstanding accomplishment in the production of materials needed in the war effort."

Long known as builders of oil-fired steam generators and portable heating equipment for road oils and bituminous materials, Cleaver-Brooks Company is manufacturing special heating equipment for the use of our armed forces in the field for disinfecting, sterilizing, water-distilling, bathing and other important hygienic



needs. Hundreds of their standard Tank Car Heaters are in service with the Corps of Engineers.

Shown in the photo holding the Army-Navy E Banner are, left to right, John C. Cleaver, President of Cleaver-Brooks Company; Lieut. Comdr. D. M. Curry, U. S. Navy; R. E. Brooks, chairman-of-the-board Cleaver-Brooks Company; Col. Paul I. Robinson, Surgeon-General's Office, Washington, D. C.; and Cleaver-Brooks Company employee representative Norman Hauck.

The Pioneer Does It Again



—Full Hydraulic Control—

The Root Model No. 55 Truck Patrol is a machine of many uses. Grading — Ditching — Shoulder Work — Cutting Sod — and Shaving Snow and Ice are but a few of its many valuable uses.

Working Today for Victory—
Tomorrow for You.

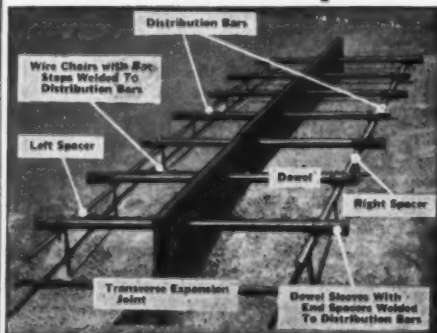
ROOT SPRING SCRAPER CO.
KALAMAZOO, MICHIGAN
Since 1891

Build Better Runways

for the Birds of War!

Insure Substantial, Long-Lasting Concrete Runways and Aprons with

LACLEDE Welded Dowel Spacers

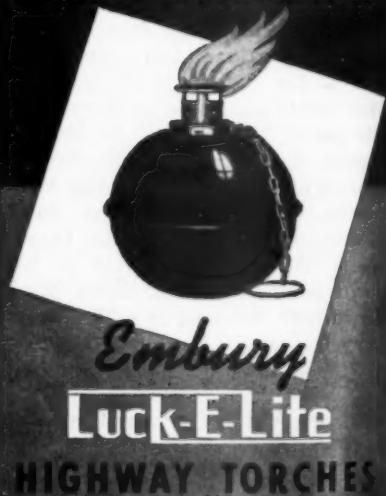


Time-Saving
Accurate — Rigid
Available Now!



LACLEDE STEEL COMPANY
SAINT LOUIS, MISSOURI

LOWEST COST FOR HIGHEST DEPENDABILITY

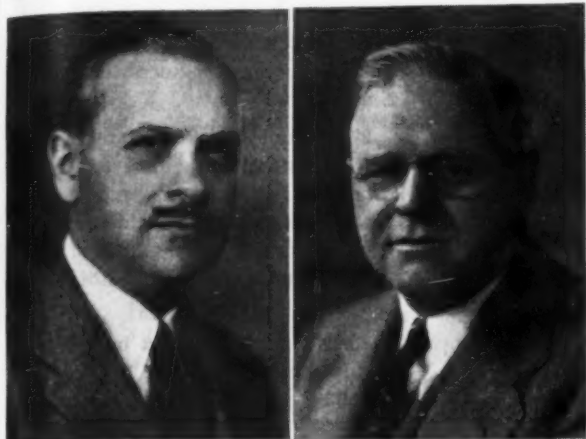


Comparative, impartial laboratory wind tunnel tests plus road performance under most gruelling conditions prove Luck-E-Lite gives greatest dependability at lowest cost. When you buy Luck-E-Lite you are getting actual predetermined safety.

Embury Mfg. Co., Warsaw, N.Y.

Galvin Heads Highway Industries Association

The Highway Industries Association, which is affiliated with the Manufacturers' Division of the American Road Builders Association, has elected E. R. Galvin of R. G. LeTourneau, Inc., president; Robert T. Harris, vice-president of the Blaw-Knox Division, vice-president; and Henry



Robert T. Harris, Vice-President, E. R. Galvin, Genl. Sales Mgr., Blaw-Knox Division R. G. LeTourneau, Inc.

Schramm, president of Schramm, Inc., secretary-treasurer.

Members of the Highway Industries Association consist of outstanding manufacturers of products used in construction of highways and represent the manufacturers in road shows and in their relationships with the American Road Builders Association.

Mr. Harris stated that at present the principal activity is in planning for the post-war period and that progress in that direction is most encouraging.

New Atlas Cement Plant Begins Operation

Start of operations in the new cement plant at Northampton, Pa., was announced on July 9 by Blaine S. Smith, president, Universal Atlas Cement Company, United States Steel Corporation Subsidiary.

The new plant is said to be the finest and most modern in the world. It is capable of making all types of cement including white cement. It generates its own power by utilizing waste heat from the kilns to operate steam turbo-generators.

The new plant also utilizes the flotation system which proportions raw materials by subtraction rather than by addition. To accomplish this it was necessary, in building the new plant, to use the wet process in contrast to the dry process used in the old plant.

Northampton, from which 8,000,000 barrels of Atlas cement were shipped for the Panama Canal, is historic in cement annals. The new plant is the fifth to be built on the same properties. Northampton plants of Universal Atlas are identified with the origin of some of the most important steps in the making of portland cement now used throughout the industry, including the first rotary kiln in America, the introduction of powdered coal, and the discovery of the retarding influence of gypsum in the setting time of cement. Here also the company made one of the first white cements and originated the American production of calcium-aluminate cement.

The new plant was designed by the engineering department of the company under the direction of P. C. Van Zandt, consulting engineer, and S. J. Robison, chief engineer. M. W. Winsch is plant manager. Turner Construction Company, New York, were general contractors.

GOOD BUSINESS . . IN THE SIGN BUSINESS



by Day

"SCOTCHLITE" signs are clean, sharp, and legible from maximum reading distances.



by Night

Identical night and day appearance is assured from signs reflectorized with "SCOTCHLITE".



You will find "SCOTCHLITE" reflective sign sheeting the ideal material to use when your sign requirements call for around-the-clock visibility at lower cost. "SCOTCHLITE'S" moderate cost permits reflectorizing of entire sign surfaces . . . giving them the same appearance by night as by day. "SCOTCHLITE'S" flexibility makes it readily adaptable to all types of signs . . . making it possible, for example, to use obsolete metal signs, which would otherwise be discarded.

For your convenience in making a test of "SCOTCHLITE", we have signs already made up at reasonable cost.

Why not write for further information on our sample offer and a free copy of our new booklet, "SCOTCHLITE".

MINNESOTA MINING & MANUFACTURING CO.

Saint Paul, Minnesota

Gentlemen: RAS 743

☐ Kindly send further information on your sample offer.

☐ Copy of free booklet "SCOTCHLITE".

Name _____

Address _____

City _____ Zone _____ State _____

3-M PROPOSED SIGNAGE
TRAFFIC SAFETY AND OTHER RESEARCH
"SCOTCHLITE" TAPE
ARROWHEAD
WALL AND BRIDGE
LAPPING AND SHADING COMPOUND
CUTTING AND FINISHING COMPOUND
PAINT PALETTE
"SCOTCHLITE"

Explosives

(Continued from page 62)

round. Keep the explosive covered and in its container until ready to use. Do not leave loaded holes in freezing temperatures unfired longer than necessary to complete the loading of the round. Fire as soon as possible. Never use explosives that are frozen. They must be thawed out to prevent a premature explosion.

16. Do not *force* a cartridge of explosive, especially a primer, into a bore hole.

17. Always use a wooden tamping stick with no exposed metal parts.

18. Collect and destroy loose packing paper from explosives to keep roadsides neat and to prevent stock from consuming it for its salty taste.

19. Be sure that the lead and connecting wires are not short circuited through exposed wires. Avoid kinking the wires.

20. Do not tap or otherwise investigate electric blasting caps or attempt to withdraw the wires.

21. Do not load or connect up shots for electric firing during the approach

or progress of a thunder storm. If charges are already loaded and connected, all persons should be kept at a safe distance from them while the storm is in progress. If necessary to leave overnight, twist the ends of the lead wire together, coil, and cover with dirt.

22. Do not connect more caps to a blasting machine than is indicated by its rating. If there is any reason to believe that a machine is not capable of firing its rated capacity, its use should immediately be discontinued until it has been repaired at the factory.

23. When springing, be sure to allow time for the sprung chamber to cool before placing the next springing charge or before loading. After each springing shot, the chamber should be blown out clean. Blowing out the chamber will help to cool the cavity.

24. Use every precaution known to insure a safe shot. Be sure that all persons are at a safe distance or under prepared or natural cover.

25. Do not use explosives having different rates of detonation in the same hole unless used only as a primer.

26. All vehicles used for transporting explosives should be in first-class condition and have warning signs. A closed body is best. If the body is metal or has metal strips, a false lining of wood should be made. Explosive packages should not be piled higher than the false body and each vehicle must be equipped with an adequate easily accessible fire extinguisher.

27. Do not store, either temporarily or permanently, explosives in any dwelling, barn, or any place where, in the event of an accident, loss of life or property damage might result. Have a regular place for storage and use it.

28. No person should be permitted to investigate a misfire until at least one hour has elapsed. The wires shall be disconnected from the blasting machine and the man in charge of the machine shall give clearance before investigating.

If there is reason to believe that the explosive is burning in the hole, no person shall return to the hole until at least 12 hours have elapsed.

SILVER KING HIGHWAY MOWER



• Watch out for those minor damages that might put your highway mower out of action for the duration. A little extra care prevents extra wear and repair!

If you own a Silver King, you'll see, more than ever, what it means to have a mowing unit **ENGINEERED** for the job. If you want replacement parts now to insure tip-top "good-as-new" performance tomorrow, write. We will be glad to serve you.

MANUFACTURED BY
THE FATE-ROOT-HEATH CO.
PLYMOUTH, OHIO



3/4
Cu. Yd.

8
Lift

FRONT END SHOVELS for Industrial Tractors

Write for Catalog

Elkhart White Mfg. Co. Indiana

PIONEER CONVEYORS

Sectionalized Steel Frames
Save Time—Money and
Material.

★ ★ ★ ★ ★
Specify Pioneer on
your next job.

PIONEER ENGINEERING WORKS

1515 CENTRAL AVE. MINNEAPOLIS, MINNESOTA
Manufacturers of Quarry, Gravel Pit and Mining Machinery

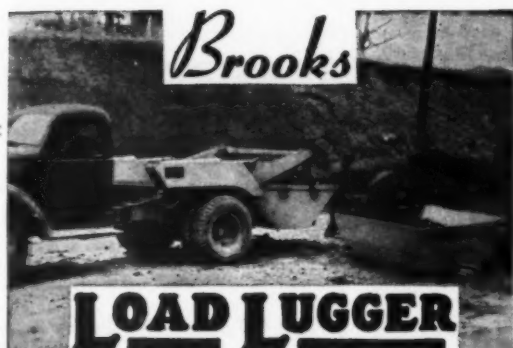


★ Modernized..
★ Beautified..

Buffalo's Most Congenial Hotel

Today, you'll enjoy your stay at Hotel Lafayette more than ever! Extensively remodeled, and redecorated, this fine hotel offers new conveniences and comfort—but the friendly hospitality is the same as ever. Excellent food, home-like rooms, reasonable prices. And remember: Hotel Lafayette is Buffalo's most centrally located hotel. Moderate rates: Single, \$2.75 up; Double, \$4.50 up; special rates for 4 or more. Write for Folder E.

HOTEL LAFAYETTE, BUFFALO, N. Y. ★ ★ M. A. KELLY
Manager



Are You Short of Help?

Then write for
CATALOG No. 44

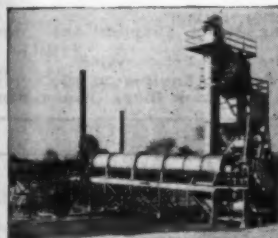
This 16-page booklet tells all about the Brooks **LOAD LUGGER**, and how you can use it on scores of material handling jobs to speed up the work, and save manpower, wherever loading is done by hand . . . road building, street repairs, garbage collection, servicing parks, and miscellaneous hauling. The **LOAD LUGGER** fits on any standard truck chassis, and is used with 5 to 10 dump buckets. Get the facts today about this time-saving equipment.

507 Davenport Road, Knoxville, Tennessee
Distributors in all Principal Cities

Brooks EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE

Asphalt Mixing Plants

STATIONARY and PORTABLE



★ Hetherington & Berner asphalt mixing plants, products of the pioneer builder of asphalt machinery in America, incorporate the latest features of design which have been proved in performance. Specifications conform to the most rigid state and city requirements, both as to engineering design and safety regulations. Write for Bulletin RS-260.

Hetherington & Berner Inc.
Indianapolis, Indiana

America's First
Builders of Asphalt
Paving Machinery

Hetherington & Berner

"MANY HAVE COME!"

Many kinds of joints have been tried; among them one has survived the test of years—"THE RIBBON DUMMY JOINT". It severs one-fourth of the slab thickness—leaving three-fourths with an irregular break for the best load transfer.

**FLEXIBLE ROAD JOINT
MACHINE CO.**

WARREN, OHIO, U. S. A.

GRUENDLER CRAFTSMANSHIP

Employed by U. S. A. in the WAR EFFORT

HEAVY DUTY CRUSHING and GRINDING EQUIPMENT

for—Heavy Ores,
Chemicals, Bauxite
and ROCK Products

Grundler Features:
**MOVING TRACK
BREAKER PLATES**
For Wet, Sticky Materials.

**TRAMP METAL
CATCHER**

Full Protection to Crusher.

Developed by Engineers who have made a Life Study of the Hammer Mill Principle for Material Reduction keeping in step with new features to meet the demands for greater efficiency and speed.

Write for our Bulletin on
Large Capacity Hammermills



WHEN THE AXIS SURRENDERS

you'll find new and improved
BYERS draglines and shovels
available to go on your job

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

WHEN THE WAR IS WON

Byers will offer you new, improved, faster
mobile cranes and shovels for peacetime jobs.

BYERS CRANES
AND
SHOVELS

RAVENNA, OHIO

DISTRIBUTORS THROUGHOUT THE WORLD

Clearing House

Critical Construction Machinery Real Buys—Immediate Delivery

ROLLERS

- 2—Rebuilt Huber 10-ton, 3-wheel, gas engine driven Rollers, rebuilt and guaranteed.
- 1—Rebuilt Gallion 10-ton, 3-wheel, 1939 model with searifier.

COMPRESSORS

- 5—Rebuilt Werthington 315 portable gas engine Compressors on 4 steel wheels—2 years old.
- 1—New LeRol—315 gas engine driven Compressor on 4-wheeled trailer.
- 4—Rebuilt Werthington 210 portable gas engine Compressors—2 years old.
- 1—Rebuilt Sullivan—210 portable gas engine Compressor—2 years old.
- 1—New LeRol—60 gas engine driven Compressor on 2-wheeled trailer.
- 1—New LeRol—105 gas engine driven Compressor on 2-wheeled trailer.

PUMPS

- 2—New Carver 2" 7,000 g.p.h. centrifugal pumps.
- 5—New Carver 2" 10,000 g.p.h. centrifugal pumps, mounted on two steel wheels.
- 3—New Carver 3" 15,000 g.p.h. centrifugal pumps on two steel wheels.
- 2—New Carver 4" 40,000 g.p.h. self-priming centrifugal pumps on two steel wheels.
- 1—New Carver 6" 90,000 g.p.h. self-priming centrifugal pumps on two wheeled trailer.

MISC.

- 1—Model 4 Huber 12" blade gas engine powered motor patrol completely hydraulic.
- 1—P & H 600 Shovel Front and dipper.
- 1—Michigan TMCT-16½ yard shovel front and dipper.
- 1—New single drum two nigger head hoist with 70 ft. mast.
- 12—Cleveland Paving Breakers.
- 9—Cleveland Rock Drills.

Large supply of air hose for immediate delivery.

GENERATORS

- 1—Rebuilt 20 KW, 125 volts, Fairbanks-Morse Diesel Generator.
- 2—Rebuilt 15 KW, 110 volts, Allis-Chalmers gas engine driven Generators.
- 5—New Universal 5 KVA, 120 volts, gas engine driven Generators.
- 1—New Koehler, 5 KVA, 120 volts, gas engine driven Generator.
- 2—New Koehler 1½ KVA, AC, 1500 watt, gas engine driven, 120 volts, single phase, Lighting Generators.
- 1—New Koehler, 10 KVA, 120 volts, 1 phase, 60 cycle, gas engine driven Generator Set.
- 2—New Lister-Blackstone "Nite-Hawk" Portable 5 KW, 120 volts, AC, Generator Sets, complete with four 1,000 watt reflectors mounted on 8' telescopic extensions mounted on two-wheel spring mounted trailer.
- 1—Rebuilt 50 KVA Superior diesel engine driven Generator, V-belt drive, 120 volts, 3 phase, 60 cycle, AC Generator, .8 power factor, powered with Superior 100 h.p. 6-cylinder diesel engine.
- 1—Rebuilt 18.7 KVA Superior diesel engine driven Generator, direct connected, powered with 2 cylinder engine, 1200 r.p.m. and Columbia Generator, 220 volts, 3 phase, 60 cycle, .8 power factor. Machine in excellent condition.
- 1—Rebuilt Buda 15 KW gas engine driven Generator Set, 110 volts, DC.
- 1—Rebuilt 7½ KW Winton gas engine driven, 110 volt, DC Generator Set.

WE BUY LATE MODEL CONSTRUCTION MACHINERY



CHICAGO CONSTRUCTION EQUIPMENT CO.

13912 SOUTH HALSTED ST. • CHICAGO, ILL.



TRANSITS and LEVELS



New or Rebuilt Sale or Rent

Headquarters for REPAIRS — any make. Factory Service. We will also buy your old instruments or take them in trade.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Bulletin RS 86.

WARREN-KNIGHT CO.

Manufacturers of Sterling Transits and Levels
136 N. 12th St. Philadelphia, Penna.

EXCEPTIONAL BARGAINS IMMEDIATE SHIPMENT

FOR SALE:

- 44C Barber-Greene Ditcher.
- 10S Koehring Mixer on 2 Pneumatic Tires.
- 4" Rex Self Priming Pump—Gasoline Power.

FOR RENT:

- 522 Barber-Greene Pneumatic Tired Bucket Loader—Gasoline Power.

PAUL L. MATCHETTE COMPANY

Exclusive Distributors for Barber-Greene Co.

Missouri — Kansas — Oklahoma
20 West 9th Street, Kansas City, Mo.

TRENCHING MACHINES

P & H Model 10-30
Digs 36" wide and 13' deep.
Excellent Condition.
Also, Like New 21 Parsons.

THE CHAS. M. INGERSOLL CO.

19930 Detroit Road Rocky River, Ohio

P&H 600 No. 3053 Shovel, 1 yd., 40' Boom. Good shape, load now, FOB Mo., \$6,000.00.

Thew Lorain 1¼ wide Dipper, 32T. Wt. FOB KC. \$4,000.00. Old but good, all gears 90%. Fine for coal or rock.

Byers rebuilt Bearcat Jr., high lift, late model Shovel, air tired factory trailer. FOB KC., \$4,500.00. Ready to go.

We have practically everything you need.

Call Wire Write

KENNEY MCHY. CO.

2136 Jefferson, Kansas City, Mo.

TIRE REPAIRS

in all sizes of tractor, truck, wheelbarrow, passenger, or 1800x24 tires.

An EQUA-FLEX "Sectional" repair constructed in your tire is guaranteed. Best results and prompt service!

We have pre-war quality used passenger, truck and some farm tractor tires.

WALLACE TIRE SERVICE, Inc.

2320 S. Michigan Ave. Chicago, Ill.

FOR SALE

1—Barber-Greene heavy duty bituminous travel plant completely rebuilt, very fine condition.

1—Insley Type "R" combination shovel dragline crane, rebuilt.

1—Koehring No. 1 Dragline and Crane, rebuilt.

1—Complete Well Point System.

Anderson Equipment Co.

Merchants Natl Bank Bldg., Omaha, Nebr.

Equipment Wanted

- 20 to 25 Ton Locomotive Crane.
- 1—600 Ft. Cap. Air Compressor.
- 1—Barber-Greene Bucket Loader.
- 1—24 x 36 Jaw Crusher.
- 1—Switching Locomotive.

RUSSELL STANHOPE

Darien,

Connecticut

FOR SALE OR RENT

- 2—2 Ton C.H.&E. Tandem Gas Rollers.
- 1000 Gal. Cap. Distributor truck.
- 4—15,000 Gal. Steel Storage Tanks.
- 12x20 Farrel Jaw Crusher.
- 3 KW and 5 KW Light Plants
- 2 Ton Asphalt Plant.

L. M. STANHOPE

305 Conestoga Road Wayne, Penna.

**BUY
WAR
BONDS**

FOR SALE

One-Ton Iroquois Asphalt Mixer.

Box 2050, ROADS AND STREETS
330 So. Wells St., Chicago, Ill.

Clearing House

FOR SALE

Pumps, All Sizes.
Power Units.
Light Plants.
150 HP Fairbanks Morse Engine.
Buckets, All Types.
27-E Pavers.
2 Bag Mixers.
Boilers.
2—12 Yard Euclid Caterpillar Wagons.
3—8 Yard Allis-Chalmers Caterpillar Wagons.
Conway Mucker.
Tunnel Loader.
Concrete Placer.
1—1/4 Yard Thew Caterpillar, Steam.
50-B Bucyrus Combination.
Booms.
Derricks.
3/4 Yard Northwest Crane, Model 105.
Tanks, 8,000 and 10,000 Gal.
15 Inch Dredge Pipe Fittings.
Road Forms.
Gasoline Pumps and Power Units.
Backfillers.

STIERS BROS. CONSTRUCTION CO.

2944 Magazine St. (6) St. Louis, Mo.

FOR SALE

1/4 yd. Bucyrus 41B Shovel Attachment.
27-E Ransome Dual Drum Paver.
2 Ton C.H. & E. Tandem Roller.
3—15,000 gal. Steel Storage Tanks.
2 Ton Asphalt Plant.
750 and 1,000 gal. Etnyre Distributors.
3—Vulcan Nos. 1 and 2 Hammers.
1 yd. Koehring Gas Cat. Crane.
110 Ton Blaw-Knox Batch Bin.
1/2 yd. Blaw Knox Clam Shell.
20 Ton Ohio Locomotive Crane.
1 yd. B-2 Steam Shovels.
15 Ton 100 ft. Boom Clyde Steel Derrick with 100 H.P. Elec. Hoist.
15 Ton Plymouth Gas Locomotive.
2—3W & 5W Monighan Draglines.
983 & 7 McKiernan Terry Hammers.

TIDEWATER EQUIPMENT & MACHINERY CORP.

305 Madison Ave., New York City, N. Y.

SAVE STEPS IN

Saint Louis

STOP
AT **HOTEL**
McEnnox
DOWNTOWN ON
YOUR DOORSTEP
RATES FROM \$3.00

**BAD GOING? Here's the
Truck that eats it up!**



If you need a truck for grading, hauling under the worst conditions, snow-removal or similar services you'll find nothing, anywhere, to equal a Marmon-Herrington All-Wheel-Drive converted Ford. Prices are surprisingly low, and operating costs a revelation in dol-

lar-savings. Write for literature.

MARMON-HERRINGTON CO., Inc
INDIANAPOLIS, INDIANA, U. S. A.



**VULCAN PAVEMENT AND
CLAY DIGGING TOOLS**

ARE MADE in a complete line of
sizes to fit all standard compressed air
hammers.

Send for NEW Vulcan illustrated CATALOG today.

VULCAN TOOL MFG. CO.
QUINCY, MASS.

**SAVE 50% ON FUEL AND
WAITING TIME**



**HEAT AND
MELT TAR,
PITCH,
ASPHALT**

**Twice As
Fast**

AEROIL "HEET-MASTER"

Complete outfits on skids or on steel tires, capacities 80, 110 and 145 gallons. All sizes can be obtained with hand spray attachment. Send for FREE BULLETIN No. 194RS. For full information of concrete curbing machines, tool and surface heaters, asphalt tools and accessories, etc. Write for FREE Catalog No. 240RS.

NEW cleaning and degreasing tanks and sprayers to keep equipment in condition (Bulletin 250RS).

AEROIL BURNER CO., INC.
5711 PARK AVE. WEST NEW YORK, N. J.
Branches: Chicago, San Francisco, Dallas

Reliance

**CRUSHING, SCREENING
and WASHING UNITS**

• Up to 2000 Tons a Day •

Crushers	Bins	Drag-Lines
Elevators	Pulverisers	"GAYCO"
Sweepers	Feeders	Centrifugal
Screens	Spreaders	Air Separators
Wash Boxes	Kettles	
	Conveyors	

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.
340 Canada Cement Co., Montreal, Que., Can.

NEED A BIG Trailer?

**La Crosse Makes Them
Up To 200 Ton Capacity—
** WRITE OR WIRE ****

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.

BUY WAR BONDS

Safe Connections... For Every Service!



"GJ-BOSS"

**GROUND JOINT STYLE X-34
FEMALE HOSE COUPLING**
For Steam - Air - Liquids

Designed to assure maximum strength, durability and safety under all conditions. Washerless construction consists of soft-to-hard metal seal that will not leak, regardless of wear or the presence of abrasive particles. "BOSS" Offset Interlocking Clamp anchors coupling to hose with a powerful grip that is proof against straight line leaks and blow-offs. Sizes $\frac{3}{4}$ " to 4", inclusive.



"GJ-BOSS"

**GROUND JOINT
AIR HAMMER COUPLING**

Same washerless, leakproof construction as style X-34 coupling, described above, and furnished with equally efficient "BOSS" Interlocking Clamp. No washers to replace... no loss of working pressure through leaky connections... no danger of blowoffs. COMPACT TYPE, style XLB-61, $\frac{1}{2}$ " and $\frac{3}{4}$ ". HEAVY TYPE, style XHB-72, $\frac{1}{2}$ " and 1".

*Sold by Manufacturers and Jobbers of
Mechanical Rubber Goods*

DIXON

VALVE & COUPLING CO.

Main Office and Factory:
PHILADELPHIA, PA.

Branches:

Chicago • Birmingham • Los Angeles • Houston

ROADS AND STREETS, July, 1943

Index to Advertisers

A		K	
*Adams Company, J. D.....	Second Cover	Koehring Company	25
*Aeroll Burner Co., Inc.....	95	L	
Allied Steel Products, Inc.....	32	*Laclede Steel Co.....	90
Allis-Chalmers Tractor Division.....	13	*La Crosse Trailer & Equipment Co..	95
American Cable Division....	Third Cover	*Le Tourneau, Inc., R. G.....	15
American Chain & Cable Co., Inc....	Third Cover, 34	Lima Locomotive Wks., Inc.....	29
American Steel & Wire Co.....	30	*Littleford Bros.	24
Armco Drainage Products Assn.....	4	M	
*Austin-Western Rd. Machy. Co.....	6-7	Marion Steam Shovel Co., The.....	31
B		*Marmon-Herrington Company, Inc...	95
*Baker Manufacturing Co., The.....	85	Matchett Co., Paul L.....	94
*Barber-Greene Co.	14	*Michigan Power Shovel Co.....	82
*Bethlehem Steel Company.....	1	Minnesota Mining & Mfg. Co.....	91
*Blaw Knox Company.....	9	O	
Brooks Equip. & Mfg. Co.....	93	*Osgood Company, The.....	18
*Buckeye Traction Ditcher Co....	8-16-17	Osmose Wood Preserving Co.....	89
Bucyrus-Erie Co.	10	*Owen Bucket Co., The.....	82
Byers Machine Co., The.....	93	P	
C		*Pioneer Engineering Works.....	92
Calcium Chloride Association.....	57	*Portland Cement Assn.....	26
Chicago Constr. Co.....	94	R	
Chicago Pneumatic Tool Co.....	12	*Relly Tar & Chemical Corp.....	84
*Cleaver-Brooks Co.	20	Rogers Brothers Corporation.....	82
Cleveland Diesel Eng. Div.....	22	Roller Bearing Co. of America.....	80
Cleveland Rock Drill Co.....	11	Root Spring Scraper Co.....	90
*Cleveland Tractor Co., The.....	61	S	
D		*Sauerman Bros., Inc.....	32
Detroit Diesel Eng. Div.....	22	Schramm, Inc.	86
Dietz Co., R. E.....	32	Standard Oil Co. (Indiana).....	92
Dixon Valve & Coupling Co.....	96	St. Paul Hydraulic Hoist Co.....	87
E		Stulz-Sickles Co.	79
Electro Motive Division.....	22	T	
Embury Mfg. Co.....	90	*Texas Co., The.....	Back Cover
F		Thew Shovel Co., The.....	3
Fawick Airflex Co., Inc.....	23	Timber Engineering Company, Inc...	68
Fate-Root-Heath Co., The.....	92	U	
*Flexible Road Joint Machine Co....	93	United States Steel Co.....	30
Foot Company, Inc., The.....	19	Universal Road Machinery Co.....	95
*Four Wheel Drive Auto Co.....	5	V	
G		Vulcan Tool Mfg. Co.....	95
*Gallon Iron Works & Mfg. Co., The..	81	W	
Gar Wood Industries, Inc.....	27	Wallace Tire Service, Inc.....	94
Gemmer Mfg. Co.....	73	Walter Motor Truck Co.....	33
*General Excavator Company.....	18	Ward, La France.....	28
*Gruendler Crusher & Pulverizer Co.	93	Warren-Knight Co.	80-94
Gulf Oil Corp.....	66	*Wellman Engineering Co., The.....	82
H		W. G. B. Oil Clarifier, Inc.....	79
Hazard Wire Rope Division.....	34	White Mfg. Co.....	92
*Hercules Co.	18	Worthington Pump & Machy. Corp.	54-55
Hercules Steel Products Co.....	88	*Advertisers with * are represented in the 1943 edition of Powers' Road and Street Catalog and Data Book. Please refer to it for additional information on any of their products.	
Hetherington & Berner, Inc.....	93	J	
Hotel Fontenelle	80	*Jaeger Machine Co., The.....	75
Hotel LaFayette	92	K	
I		L	
Insley Mfg. Co.....	32	M	
*Iowa Mfg. Co.....	21	N	
J		O	

18,000 WORKERS WIPE OUT!
BY INDUSTRIAL ACCIDENTS

HELP PREVENT MANY ACCIDENTS WITH
AMERICAN CABLE **TRU-LAY** *Preformed* WIRE ROPE

You would be horrified at newspaper headlines which said the enemy had wiped out an entire division of the U. S. Army! Yet, in 12 months after Pearl Harbor, an entire division of industrial workers were killed by accidents—*many of them needlessly*.

Many operators have drastically reduced time-out accidents (and compensation claims) by adopting American Cable **TRU-LAY** Preformed—the safer wire rope. Being preformed, American Cable **TRU-LAY** is flexible—much easier to handle. It resists kinking and snarling. Worn and broken crown wires lie flat and in place, refusing to wicker out to puncture hands and possibly cause blood poisoning. Furthermore, being preformed, **TRU-LAY** will last longer than ordinary wire rope. It has far greater resistance to bending fatigue and that means reduced machine shutdowns for replacement—steadier production—greater dollar value. Do everything possible to reduce time-out accidents—everything possible to maintain high production. All American Cable Ropes made of Improved Plow Steel are identified by the Emerald Strand.

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*



Your post-war road or street program

A series of advertisements pointing out
how TEXACO Asphaltic products
can fit into your program

4

TRAVEL PLANT
SURFACING
with
TEXACO
LIQUID
ASPHALT



Large photo: Travel Plant at work on Wisconsin highway. Note windrow of aggregate uniformly coated with TEXACO Slow-curing Oil. Tank truck delivers TEXACO to Plant without interrupting work. Small photo: Travel Plant picks up untreated aggregate from windrow.

There are TEXACO Asphalt surfaces of the Travel Plant type in all parts of the country—proof in itself of the merit of this method of construction.

Frequently, all or part of the aggregate for a TEXACO surface of the Travel Plant type is found on the road or street to be surfaced—or near by. This eliminates or greatly reduces hauling of aggregate. Travel Plants turn out a large tonnage of TEXACO-coated aggregate per hour, making possible rapid completion of a project, with minimum inconvenience to traffic. A small crew of men and little equipment are needed where this method is employed.

The aggregate is bladed into a measured wind-

row along the road. Moving at a steady pace, the Travel Plant picks up aggregate from this windrow, thoroughly mixes it with TEXACO Asphalt and deposits the coated aggregate in another windrow behind it. Blade graders spread the mix to the desired depth and it is rolled.

TEXACO Cutback Asphalt, Slow-curing Oil and Emulsified Asphalt are all suitable for Travel Plant construction. Which TEXACO product to use depends upon the kind and grading of the aggregate. Tank trucks deliver TEXACO to the Travel Plant without interrupting its progress.

TEXACO Asphalt surfacing by Travel Plant may be the best answer to your post-war road or street problem. Keep it in mind.



THE TEXAS COMPANY, Asphalt Sales Dept., 135 East 42nd Street, New York City
Boston Philadelphia Richmond Chicago Houston Jacksonville

TEXACO ASPHALT